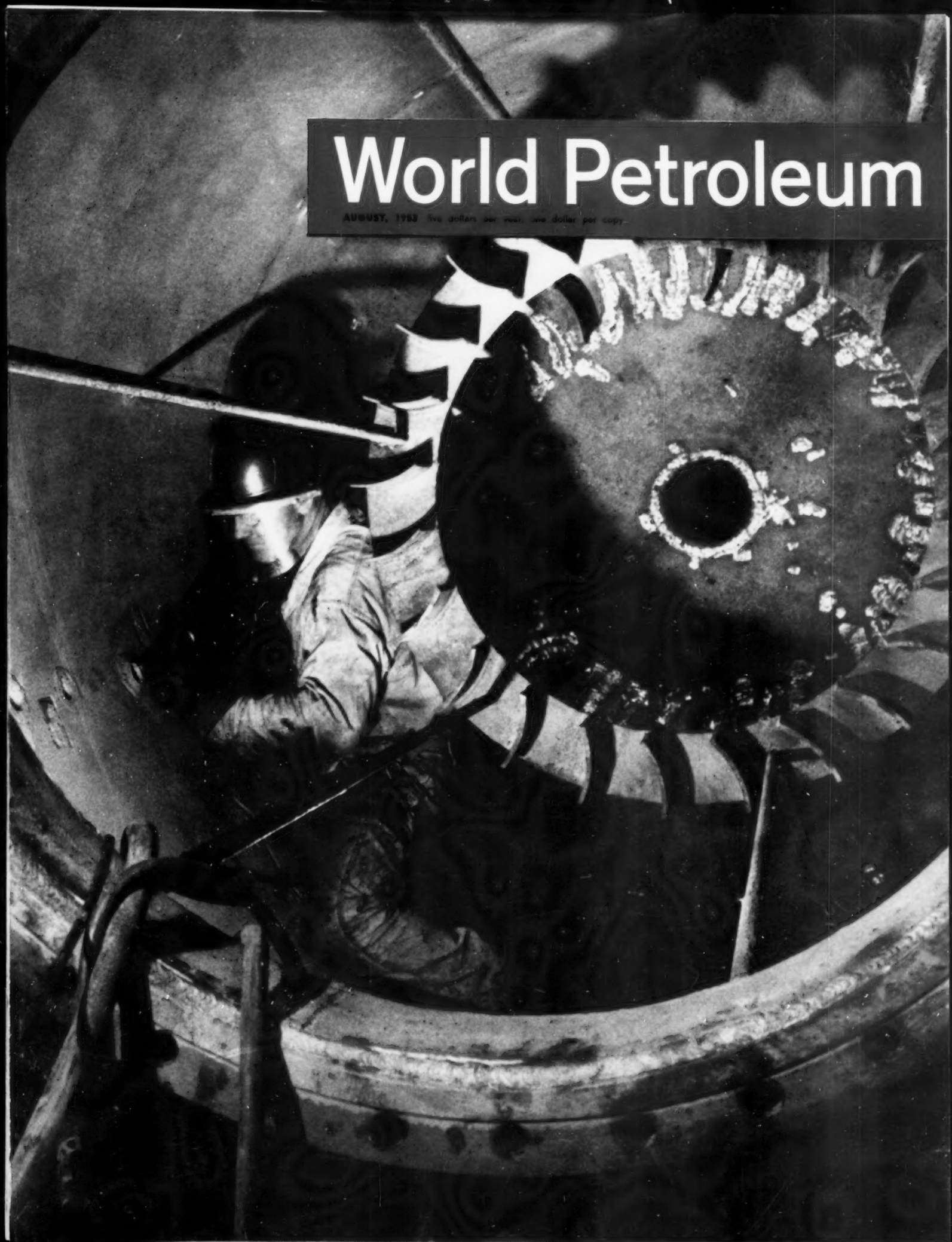
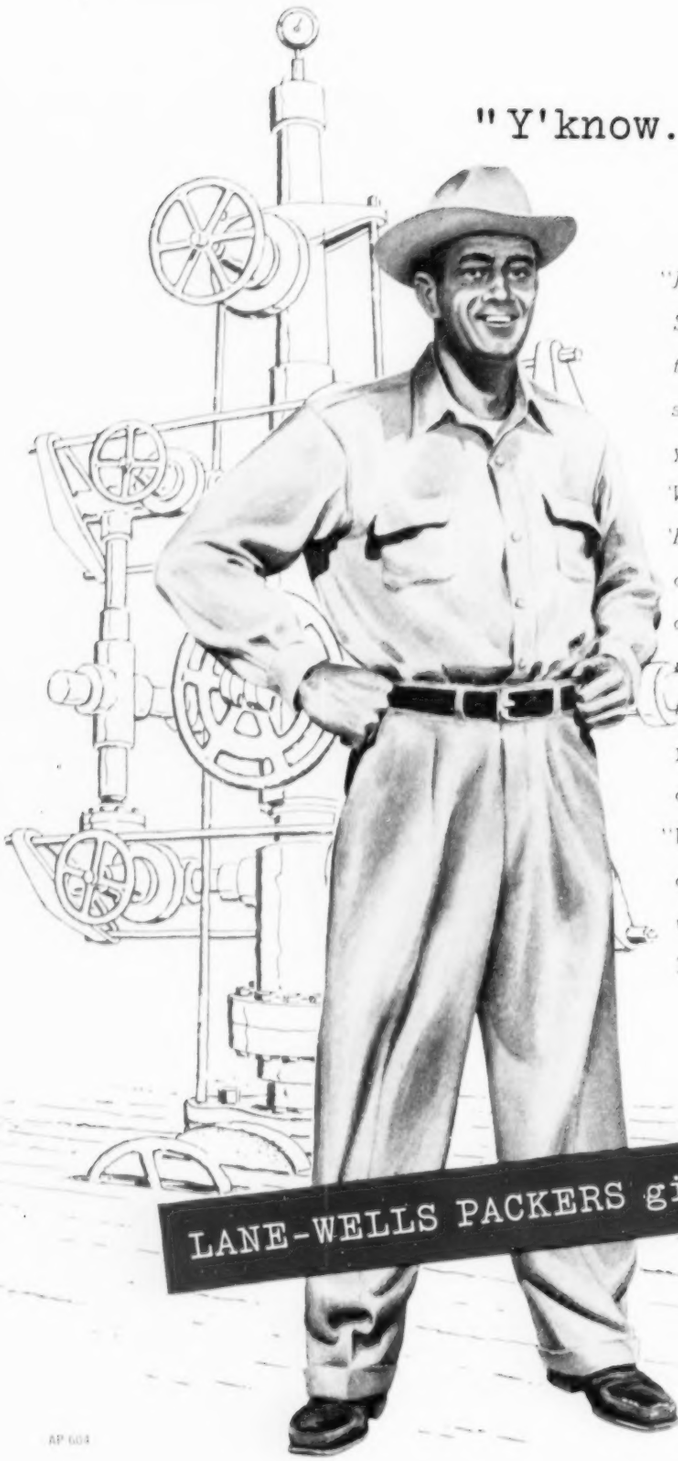


World Petroleum

AUGUST, 1953 five dollars per year, one dollar per copy



"Y'know...the man's right!"

"Joe, the Lane-Wells man, I mean. Sometime back, he was urging me to try Lane-Wells packers. So I said, 'Why should I?' 'Because they'll give you better service,' he says. 'Why?' I said. 'Give me a reason.' 'Easy!' he comes back. 'Because oil-country men design 'em and build 'em to do the job the way you fellows want it. They run in easily, they set right where you want 'em, they give you leak-proof packoff just as long as you need it, they release without a struggle, and come out ready for more.'

"Well, he went on, giving me construction details and a raft of information. The upshot was, I tried some. Then I got some more. The man's right!"

LANE-WELLS PACKERS give me better service!

Tomorrow's Tools - Today!

AP 604

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LANE WELLS COMPANY

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

Unique

"Newallastic" bolts and studs have qualities which are absolutely unique. They have been tested by every known device, and have been proved to be stronger and more resistant to fatigue than bolts or studs made by the usual method.

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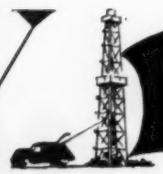
POSSILPARK GLASGOW · N

What's NEW

In Perforating, Logging, and Fishing Tool Services



McCULLOUGH
NEW SERVICES • NEW TOOLS
NEW WAYS OF DOING THINGS

Latest News About New Tools, Techniques and Services

Recover All Free Pipe in

Two Easy Operations

Know exactly where the pipe is stuck — Free it faster with the world's fastest Back-Off Service

McCullough Magna-Tector and String Shot

All free pipe is recovered in two easy operations by the world's fastest back-off service. The McCullough Magna-Tector locates the stuck point with extreme accuracy in a matter of minutes. The String Shot loosens the first joint above the stuck point. The free pipe is backed off and removed from the well. Drill collars or pipe remaining in the hole are usually recovered by wash over and fishing operations. Selected joints in the remaining stuck pipe may be loosened in advance so that sections of the fish can be recovered, progressively deeper as they are washed over.

These two tools not only quickly and easily recover all free pipe and pave the way for the economical recovery of the stuck portion; they also successfully perform the unusual, tough jobs that are otherwise so costly and time consuming.

More than 8,000 jobs have been successfully completed by the McCullough Magna-Tector and String Shot—jobs that have saved thousands of dollars and hundreds of hours of rig time.

TYPICAL JOB ACCOMPLISHMENTS

1. Stuck drill pipe job on a deep well. The Magna-Tector found free point at 7472 feet. Ran String Shot and backed off at that point. Remaining 9400 feet of 4½" drill pipe was recovered by wash over operations and the use of the Magna-Tector and String Shot. Twenty String Shots were run and completed without a single miss.

2. The McCullough Magna-Tector located the stuck point in 7" O.D. drill collars at 8100 feet. The String Shot loosened the first joint above the stuck point. All free pipe was recovered successfully even though operations were conducted in a dog leg in a 56° slant hole.

3. The McCullough Magna-Tector was run through 2⅞" tubing, through the 2" I.D. of a spear and located the stuck point in 6⅝" liner at 5185 feet. All free pipe and the stuck portion of the liner, were recovered in a few simple, economical operations.

4. Three hours and 55 minutes of rig time was all it took to locate the stuck point at 10,600 feet and backoff 3½" drill pipe with McCullough Magna-Tector and String Shot.

5. The Magna-Tector revealed that the packer was stuck in 7" casings. A fifteen foot String Shot, 200 grains of explosive per foot, was placed through the body of the packer and detonated. Packer came loose immediately. There was no damage to either tubing or the packer.

THOUSANDS OF DOLLARS AND HUNDREDS
OF HOURS OF RIG TIME HAVE BEEN SAVED BY THE
McCULLOUGH MAGNA-TECTOR AND STRING SHOT

. . . Call your McCullough Service Engineer for full information, or write for technical bulletin #401—IT CAN SAVE YOU MONEY.

PERFORATING, RADIATION LOGGING, AND FISHING TOOL SERVICE—ANYWHERE—ANYTIME.

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WORLD PETROLEUM for August, 1953. Vol. 24, No. 9. August, 1953. WORLD PETROLEUM is published monthly by Mona Palmer, Trustee under the will of Russell Palmer, 604 Fifth Ave., New York 20, N. Y. Acceptance at East Stroudsburg, Pa., under Section 34.64 P. L. & R. Authorized. Subscription rate: $5.00 per year, single copies $1.00.

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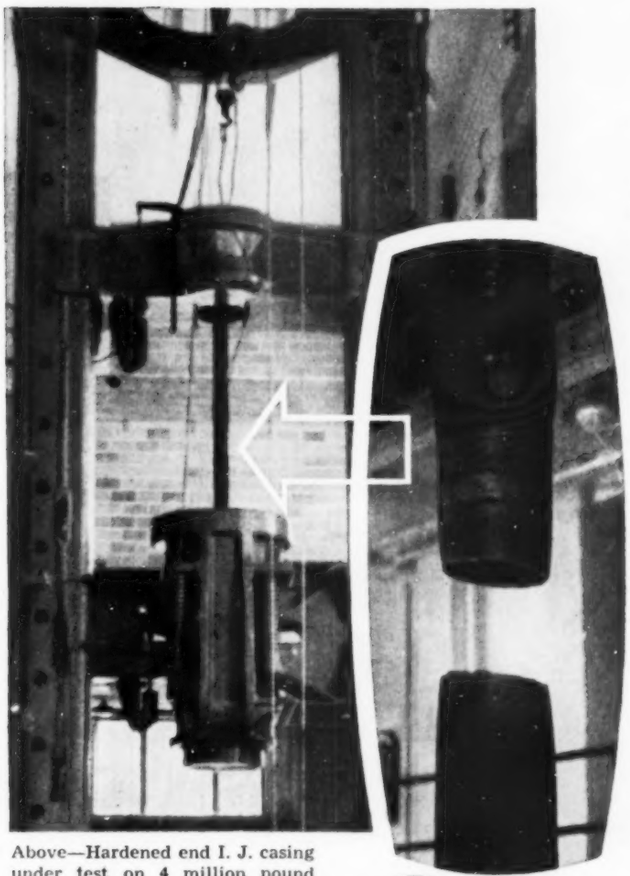
EXTRAS *that make it* BETTER



Above—Hardened end I. J. casing under test on 4 million pound testing machine at University of California. Closeup at right—Note that tested pipe broke in body, away from threaded connection.

Hardened Ends and API Threads on Youngstown Deep Well Casing

YOUNGSTOWN casing - Integral Joint and Threaded and Coupled - is produced with heat treated ends to meet the higher requirements of deep well drilling. The advantages are:

1. Controlled heat treating of ends assures homogenity of structure throughout the pipe wall.
2. Hardening makes upsets unnecessary, thus eliminates obstructions on the internal surface of the casing.
3. High joint strengths - meeting requirements of API Bulletin 5A-1 - are proven by repeated tests.
4. Integral joints improve long strings by eliminating half the threaded joints. Simplification also results as the same thread can be used for an entire string, heat treated on top, untreated on bottom. No crossover joints required.

For data on actual performance in the field, write or phone the nearest Youngstown District Sales Office.

QUALITY YOUNGSTOWN SERVICE

Youngstown

OIL COUNTRY TUBULAR GOODS

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

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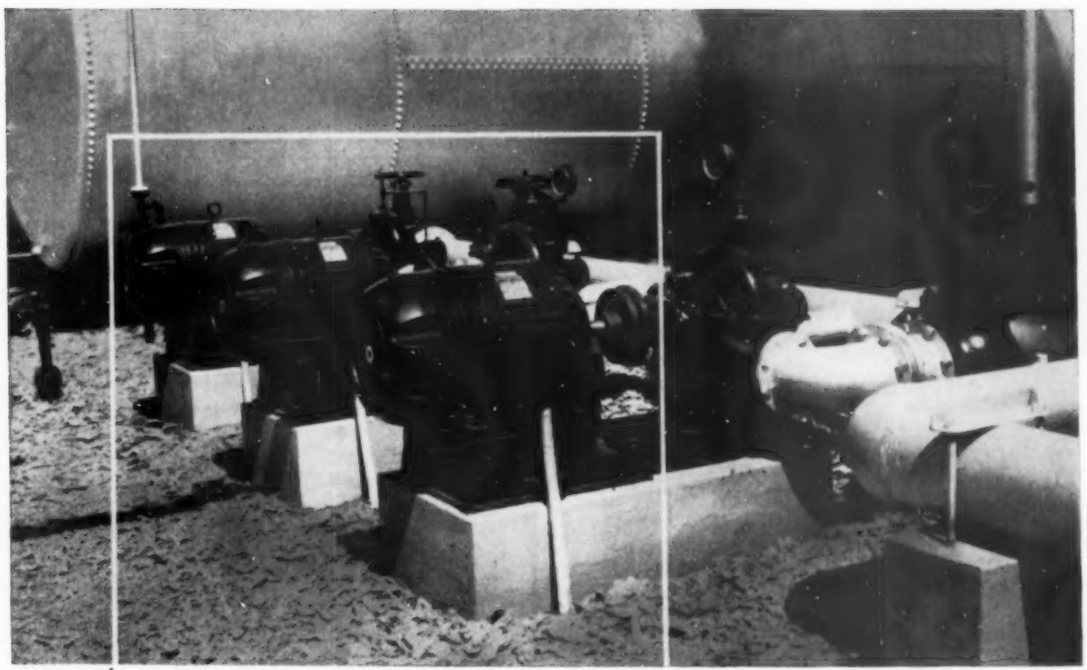
Oil helps him keep us healthy...

What makes a doctor? Long years of learning, a deft pair of hands, eyes that see beneath the surface, a mind that must make life-or-death decisions in a clock's tick. Working hours: 24 a day. Responsibility: unlimited. Petroleum, so useful in so many fields, is helping the doctor, too. A lot of his "magic" aids — such as antiseptics, drugs, sedatives, dressings — are produced from this vital resource. Through continuous research and superior petroleum products, The Texas Company has long served our country's medical profession.

The Texas Company

TEXACO

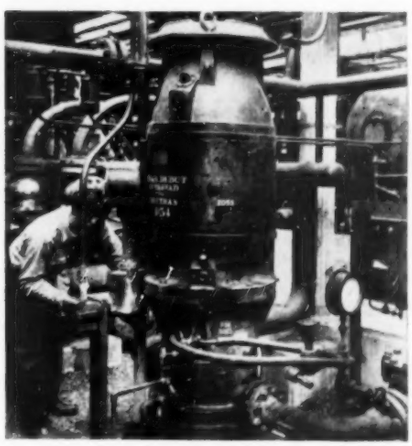


3 centrifugal, circulating-water pumps at refinery driven by G-E explosion-proof, squirrel-cage, induction motors—300-hp, 1800 rpm each.

G-E Explosion-Proof MOTORS give you continuous SAFETY

General Electric, using long experience with oil industry needs, has built a broad line of explosion-proof motors that reduce your refinery hazards with these features:

- **Sturdy, cast-iron, double-shell frame and end shields, plus . . .**
- **Reinforcing ribs for strong enclosure . . .**
- **Non-sparking fan . . .**
- **Explosion-proof box**



G-E vertical, explosion-proof, induction motor drives refinery charge pump.

THESE BUILT-IN SAFETY FEATURES HELP YOU!

Save Installation Expense—No special isolation or remote coupling needed.

Reduce Insurance Cost—Economy of G-E units is greater.

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Save on Maintenance—Motor life is prolonged with compact enclosure, tight joints, corrosion-resistant materials. Yet less care is needed.

G-E Control Puts Safety First, Too! G-E oil-immersed starters have all contact tips, connections, terminals at least 6" below oil level. Coordinated starters, circuit breakers, overload relays protect motor under all overload and short circuit conditions.

See your G-E representative. Learn how G-E motors and control make continuous safety work to your profit. Write for Bulletin GEA-4131. International General Electric Co., Apparatus Sales, 570 Lexington Ave., New York 22, N. Y., U.S.A. 14-53-1TE

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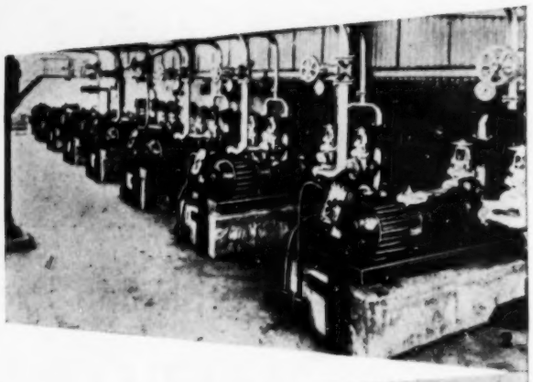
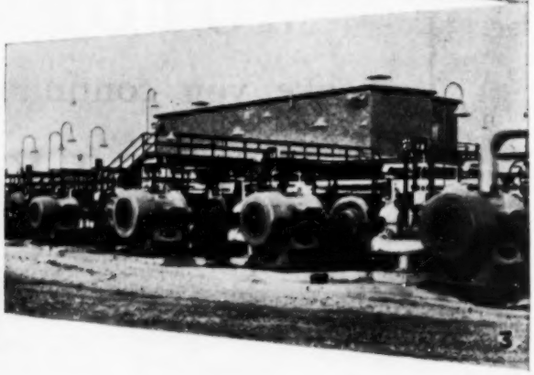
FLAMEPROOF MOTORS

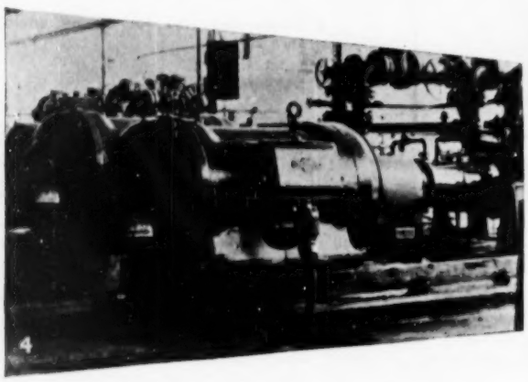
certified for group 2 and group 3 gases

A complete range of Metrovick Buxton-certified flameproof motors is available for refineries and petro-chemical works, for either indoor or outdoor use. Machines with either ball and roller bearings, or sleeve bearings, can be supplied, and all are suitable for hot product pumps.

A specialised range of splash-proof well-pump motors and industrial type machines for non-hazardous locations is also available.







1. *A range of flameproof motors in one of the main pumping stations at Scottish Oils, Grangemouth Refinery.* 2. *Type KFB flameproof motors driving Sigmund pumps at Shell Stanlow Refinery.* 3. *300-600 hp outdoor flameproof motors at the product loading station at Esso Refinery, Fawley.* 4. *125 hp 3500 rpm T.E.F.C. motors driving oil pumps at Trinidad Leaseholds Pointe-a-Pierre Refinery, British West Indies.*

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED
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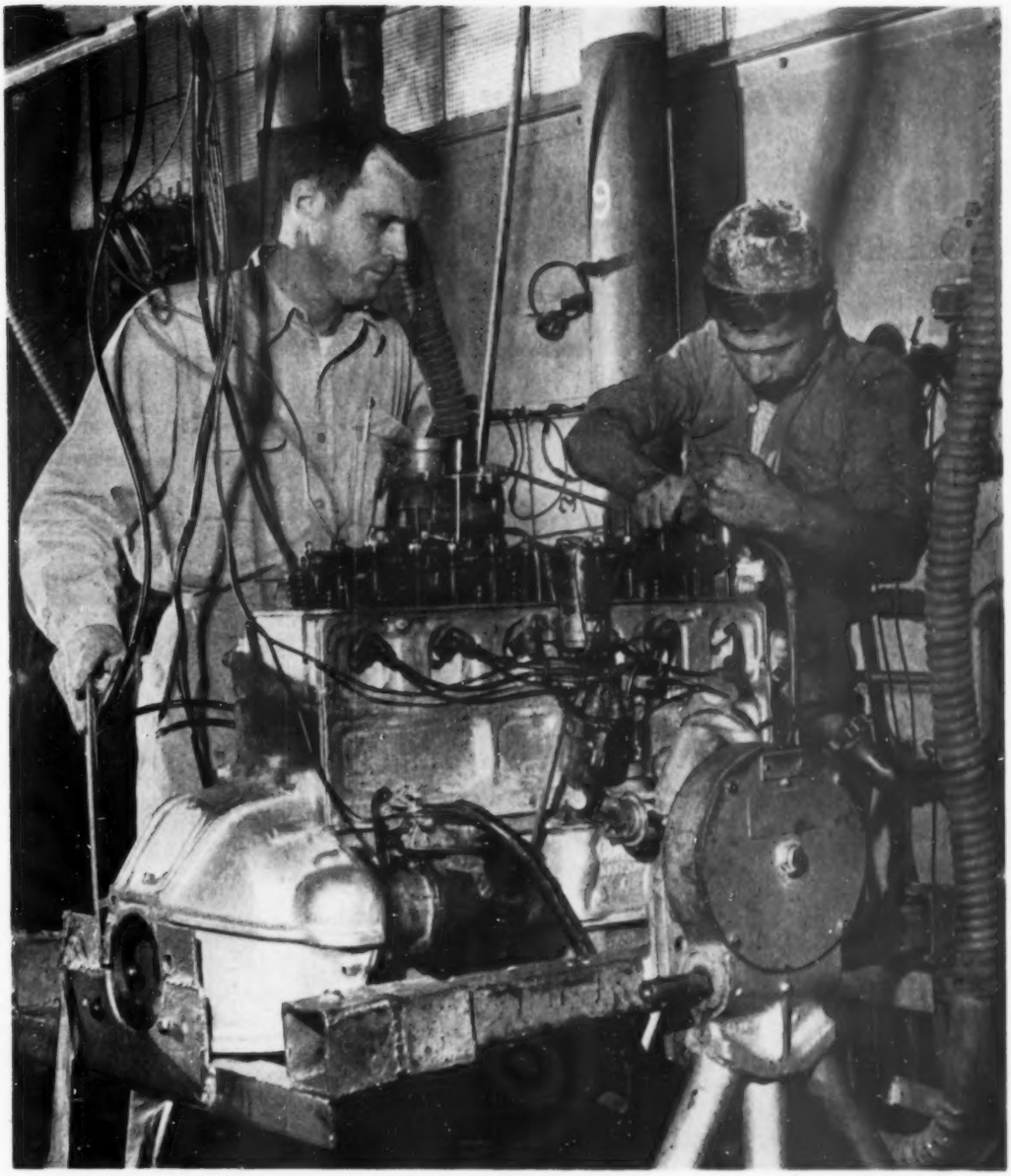
METROVICK *Motors Serve the Oil Industry*



Arabian American Oil Company

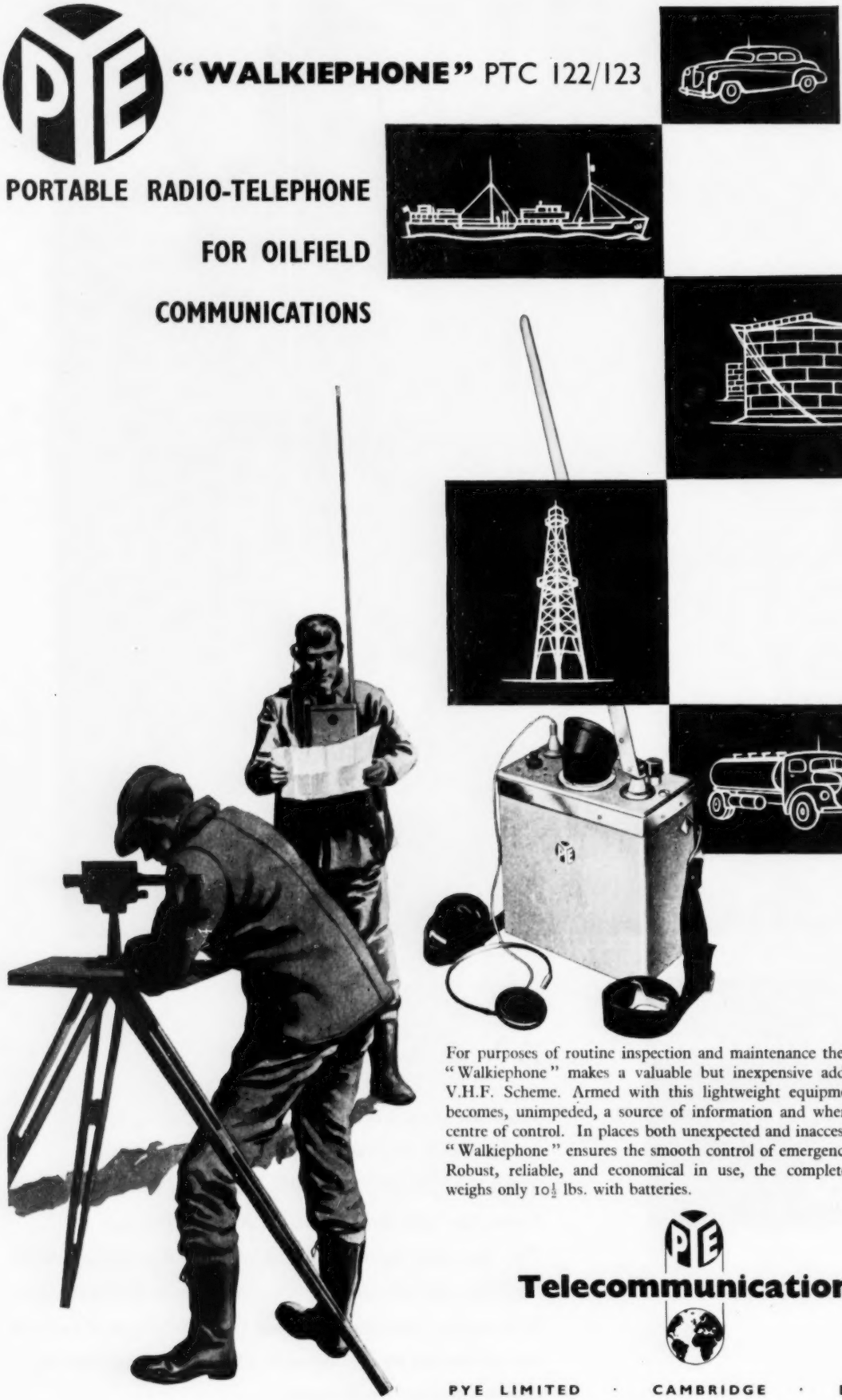
DHAHRAN Saudi Arabia — NEW YORK U.S.A.

AN EXPERT

This maze of mechanism would have bewildered the average Saudi Arab twenty years ago. Times have certainly changed because today many young Saudis like Salih ibn Khadim are expert mechanics. They have been carefully trained by the Arabian American Oil Company and now can stand up with the best in their trade. Salih and his American supervisor, C. W. Robertson of Concord, N. C. are test running an auto engine at ARAMCO's reconditioning shop in Dhahran, Saudi Arabia.

"WALKIEPHONE" PTC 122/123

PORTABLE RADIO-TELEPHONE FOR OILFIELD COMMUNICATIONS



For purposes of routine inspection and maintenance the Pye V.H.F. "Walkiephone" makes a valuable but inexpensive addition to any V.H.F. Scheme. Armed with this lightweight equipment one man becomes, unimpeded, a source of information and when required, a centre of control. In places both unexpected and inaccessible the Pye "Walkiephone" ensures the smooth control of emergency operations. Robust, reliable, and economical in use, the complete equipment weighs only 10½ lbs. with batteries.

Telecommunications

PYE LIMITED · CAMBRIDGE · ENGLAND

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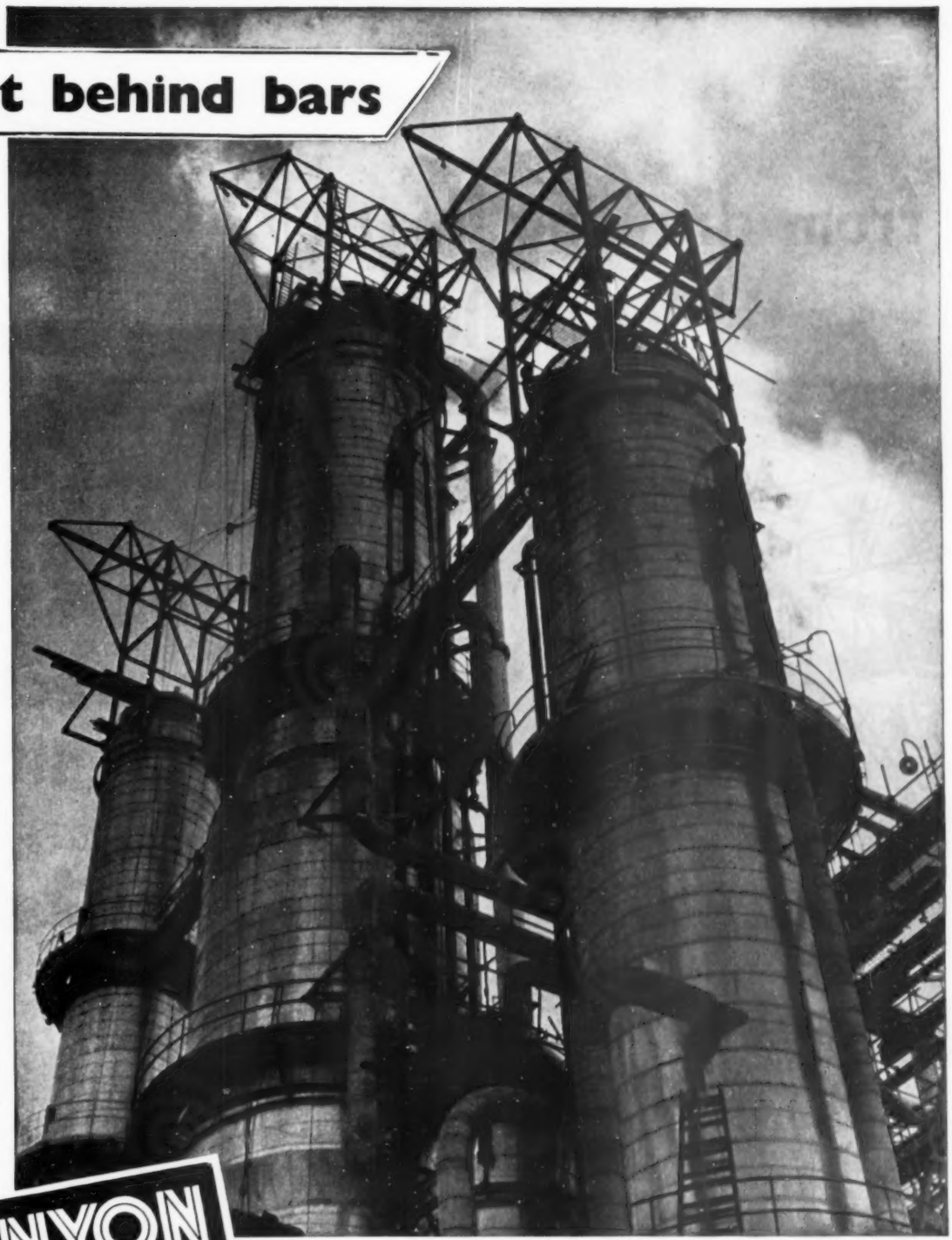
Heat behind bars



A Shell Photograph

KENYON *Planned* HEAT INSULATION

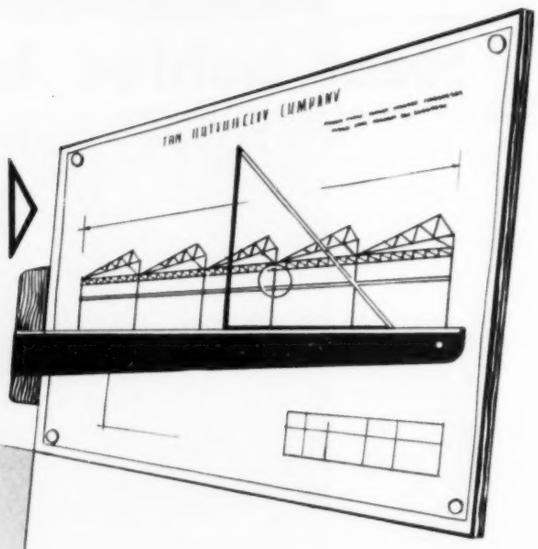
Kenyon provide a *complete* thermal insulation service to the oil industry, including technical advice on thermal insulation specifications, and finishes for all conditions. Supply of materials, application, supervision, on sites throughout the world. The photograph shows columns on the Distillation Unit, M.E.C. project at Ellesmere Port, Cheshire.

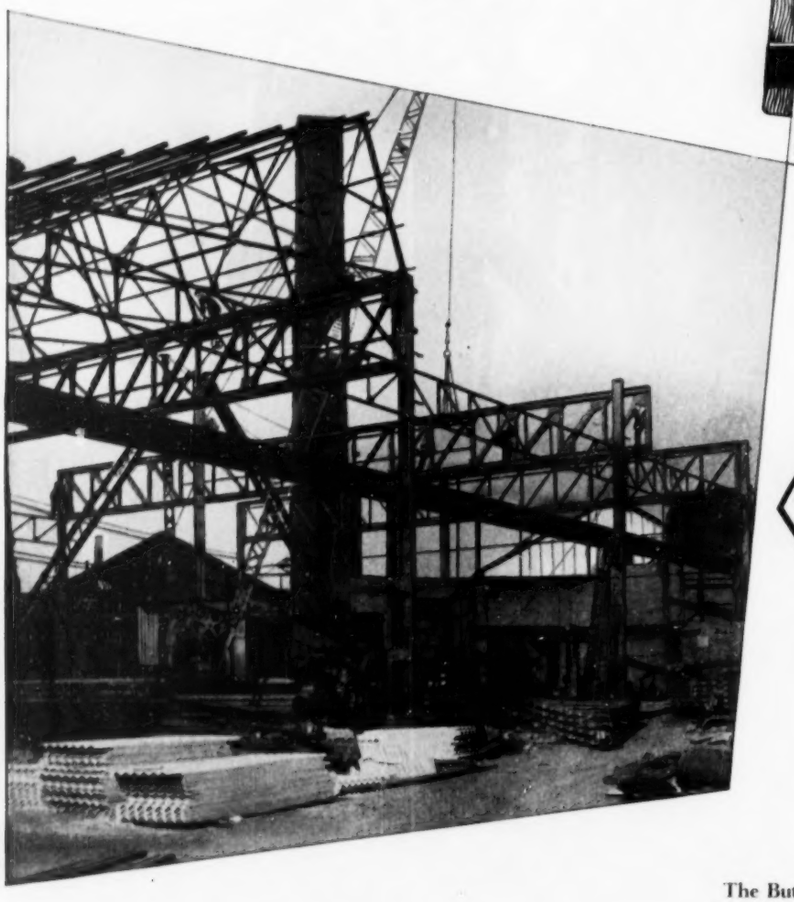
Call in KENYON to keep the heat in!

WM. KENYON & SONS (AMERICA) LTD., PERTH AMBOY, N.J., U.S.A.

WILLIAM KENYON & SONS LTD., DUKINFIELD, CHESHIRE, ENGLAND

from drawing board





to erection on site

BUTTERLEY

Constructional Steelwork

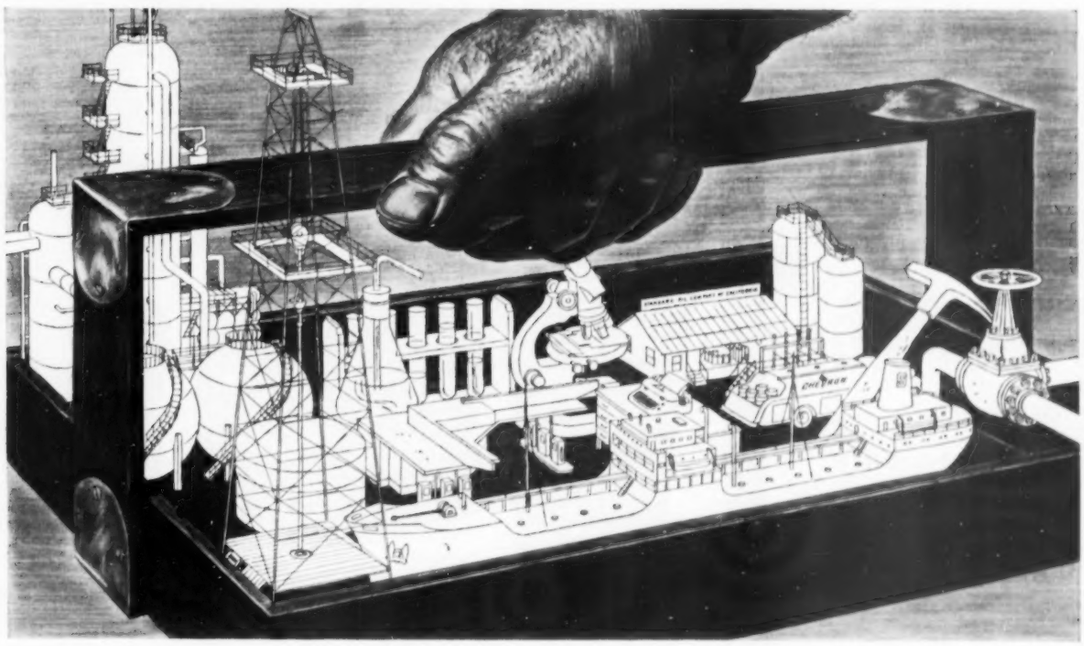
The Butterley Company has been engaged in constructional steelwork from its early days and examples are to be found in all parts of the British Isles and in many countries overseas. From design, through the stages of fabrication to erection on site, every structure is invested with the skill and knowledge which have made the Butterley Company famous in the field of constructional steelwork. Welded methods are widely employed today and the shops are well-equipped to undertake the largest and heaviest work of this nature.

THE BUTTERLEY COMPANY LIMITED
RIPLEY, DERBY, ENGLAND
LONDON OFFICE: 20 ASHLEY PLACE, VICTORIA, S.W.1

CS-37

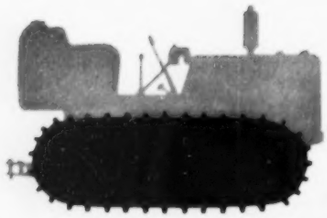
How his $51,000 tool kit works for you

Yesterday—*Manpower* and a drill rig contrived from a springy sapling, cable and drill bits sank our first wells. Since the rudimentary tools restricted their depth, they produced little oil. The "tea kettle" refineries of the day were limited, too. They utilized only a portion of the petroleum and turned out a small number of useful products.



Today—*Each of our 34,750 Standard Oilers works with an average $51,000 worth of tools.* They use diesel-electric drill rigs to tap oil pools as far as three or more miles deep. With refinery units that rearrange the structure of petroleum molecules they make each drop of crude useful. Ingenious production, refining and research "tools" like these enable Standard Oilers to make more than 1100 different products from a barrel of oil . . . gasoline 50% better than it was 25 years ago, and wear-saving lubricants; ingredients for wrinkle-resistant fabrics, low-cost plastics and work-saving detergents; sprays to increase farm crops; asphalt for roads, and many more. Standard's investment in "tools" to make oil serve you better amounts to $1,772,000,000. That's $51,000 worth for every Standard Oiler. With this $51,000 tool kit he not only makes more products—he makes them better, cheaper, more easily available. Questions or comments are always welcome. Write: Standard Oil Company of California, P. O. Box 3495-A, San Francisco, California.

STANDARD OIL COMPANY OF CALIFORNIA ***plans ahead to serve you better***

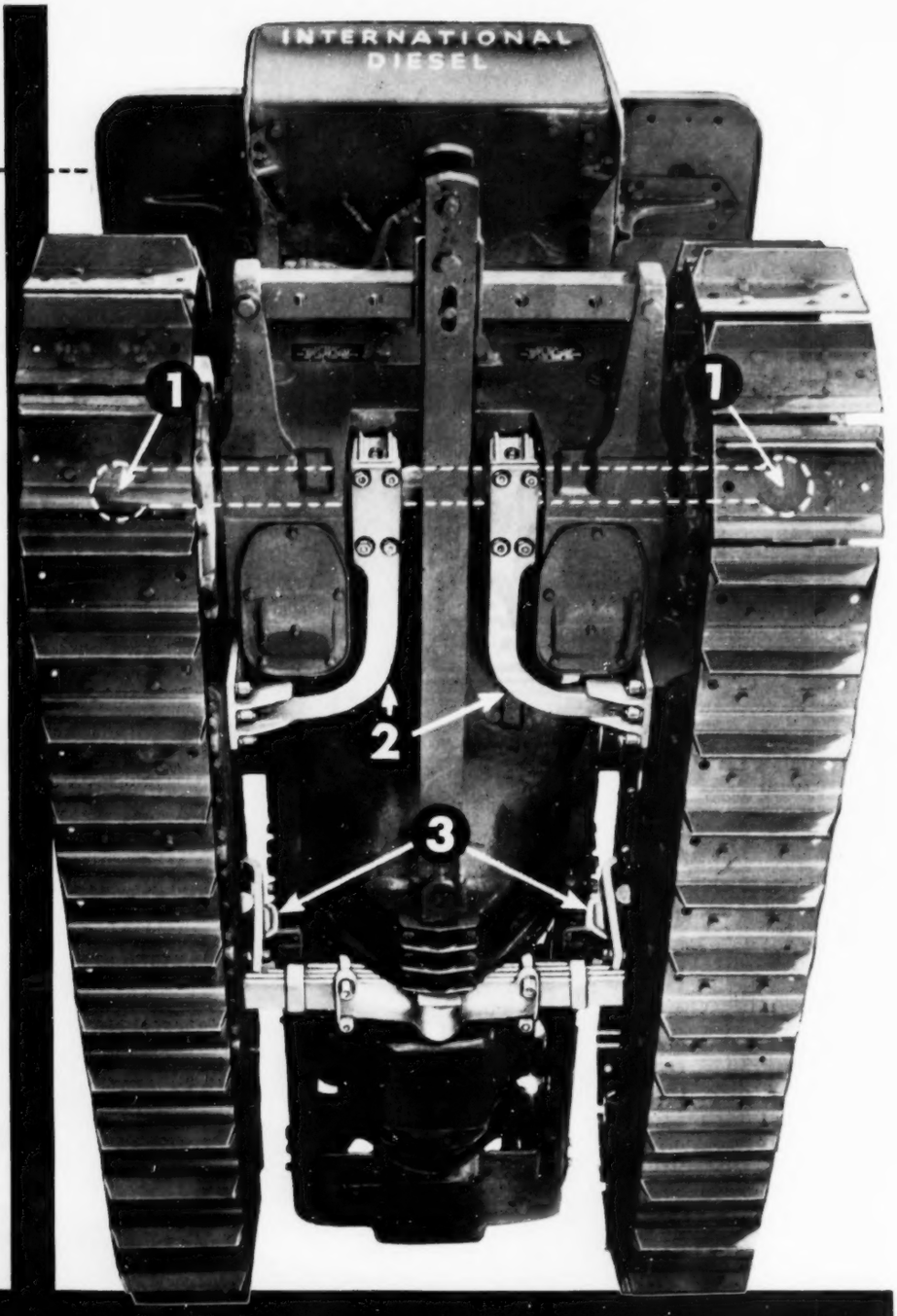


only
INTERNATIONAL CRAWLERS
offer 3-point track suspension

Engineered for Endurance

IH exclusive feature assures—

★ Top Performance
★ Simplified Maintenance
★ Long Life



INTERNATIONAL
INDUSTRIAL POWER

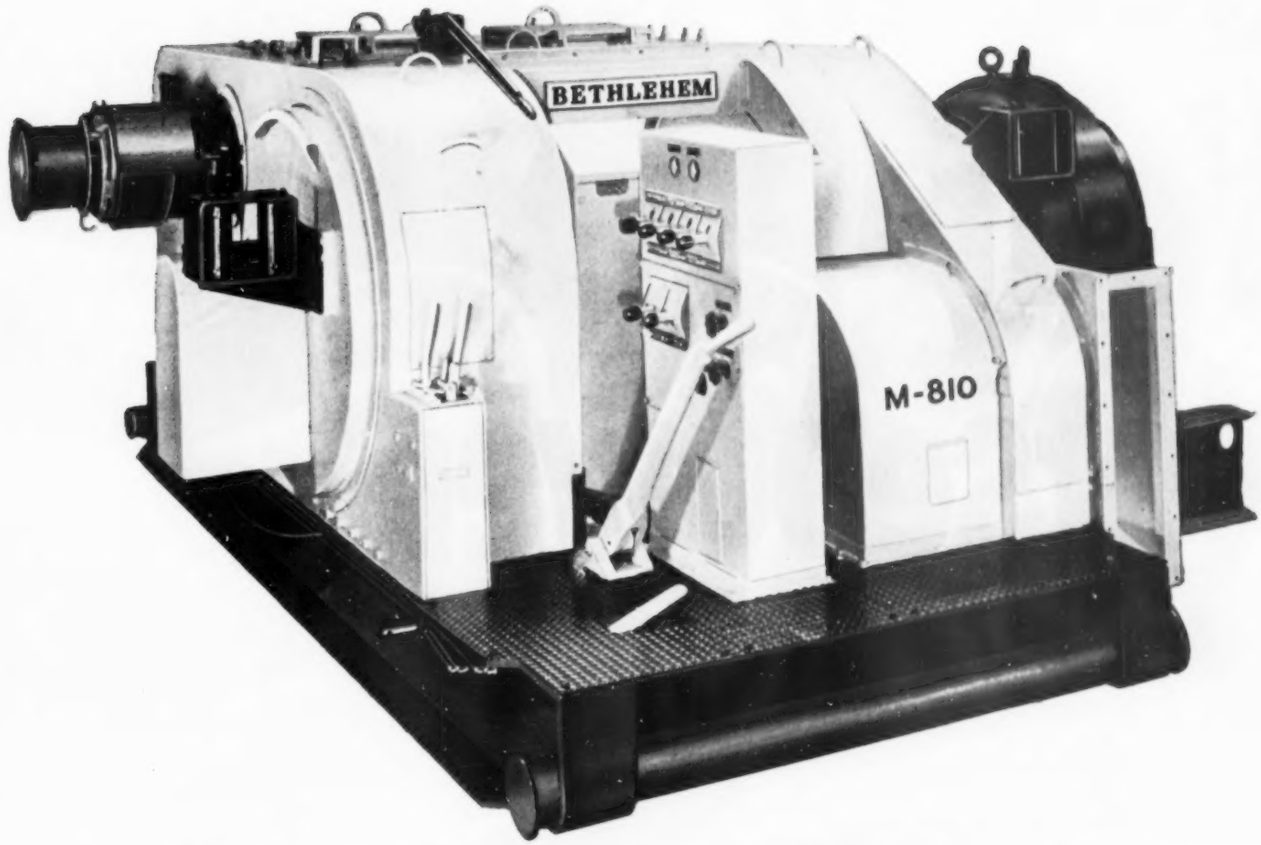
International Harvester Export Company
180 N. Michigan Ave., Chicago 1, U.S.A.

• Three-point track suspension is a feature on *every one* of the five International Crawler Tractor models – another example of International Harvester's progressive engineering.

Illustration shows how track frames are mounted on pivot shaft by ball-and-socket joints (1). Heavy steel arms (2) that slide on special bearings on the pivot shaft keep track frames from tilting in or out. Front stabilizer (3) keeps tracks in proper lengthwise alignment.

Leverage loads cannot cause track, final drive or pivot shaft misalignment . . . and that cuts maintenance problems and down time. Get all the facts on International Crawler Tractors from your International Industrial Power Distributor.

A New, Powerful DRAWWORKS



in the medium-heavy drilling class

Meet Bethlehem's M-810—a smooth, power-packed drawworks built for work in the medium-heavy drilling range. It's a rig that hasn't been hurried along; we spent years designing, testing, and checking the pilot model before the M-810 was released for production.

This is a tough, sturdy rig equipped with mechanical drive, fluid coupling, or torque converter—whichever you choose. It's a rig with tremendous clutch capacity (low-speed drum clutch, 102,000 ft-lb). Compare this with the figure you'll find in competitive rigs of the same class!

The M-810 has other fine features, too—features that help make the going easier, less costly. For instance:

- **Extra-large, extra-powerful brakes cooled by enclosed circulating-water system**
- **2- or 3-engine drive with single or double pump drive**
- **Disconnecting Airflex-clutch-controlled pump drives**
- **Big, strong shafts throughout; short bearing centers**
- **Engine compound and drawworks transmission clutches of disengaging spline type; master and high- and low-speed drum-drive clutches of extra-high-capacity air friction type**
- **Supplementary upper-drum assembly available if desired**

The M-810 is a highly flexible rig that permits a wide latitude in the choice of engines and engine combinations. Moreover, it's designed for easy moving from place to place; the engine compound is a sectionalized type.

Write us for full information about this new high-speed drawworks; complete details will be sent promptly.

BETHLEHEM STEEL

BETHLEHEM STEEL EXPORT CORPORATION

25 Broadway, New York 4, N. Y., U. S. A.

Cable Address: "BETHLEHEM, NEWYORK"

Bethlehem manufactures a full line of drawworks, slush pumps, crown and traveling blocks, swivels and rotary tables for shallow, medium, and deep drilling; and, for production work, pumping units in a wide range of sizes and types.

Seal in All Your Horsepower

with the Veedol Motor Oil "Film of Protection"

GET all the horsepower engineered into your powerful modern engine. Seal in the great performance your car can give . . . with the famous VEEDOL "Film of Protection."

VEEDOL Motor Oil *seals in* horsepower by resisting blow-by! It contains detergent additives that suspend contaminants, leaving your engine cleaner after draining. And it combats the metal-eating action of "engine sweat" by forming the famous anti-corrosion "Film of Protection" on metal surfaces.

Don't waste horsepower! Get VEEDOL Motor Oil and *use* all the power your car can deliver!

TYDOL

TIDE WATER ASSOCIATED OIL COMPANY
New York Tulsa San Francisco

FEDERAL

Federal Flying -A- Tires . . .
Good for a long safe ride!

about Fire-Fighting Foam

1 For the extinction of large oil and spirit fires. Mechanical Foam is acknowledged to be most effective of all Fire-fighting agents.

2 The best possible foam is that produced by "Pyrene" Foam-making Compound used in conjunction with "Pyrene" Foam Generating Equipment.

3 This Foam not only extinguishes the flames, but its stability and viscosity are sufficient to resist extreme heat, thus providing a protective "blanket" against re-ignition.

4 "Pyrene" Foam-making Compound is manufactured in four grades, i.e.—Standard Compound, Low Viscosity Compound, Alcohol-resistant Compound (specially effective against fires involving alcohols), and Pre-mix Compound for use in equipment where a ready-mix solution of compound and water is required.

5 The comprehensive range of "Pyrene" Portable, Mobile and Fixed Fire Protection Equipment provides the right safeguard against every type and size of oil and spirit fire risk.

6 The elimination of long runs of pipe-line, plus the ease with which "Pyrene" Mechanical Foam Systems are applied to modern oil tank and refinery requirement combine to give economy with the highest efficiency.

. . . ensure maximum fire protection with

Pyrene TRADE MARK FOAM GENERATING EQUIPMENT

Pyrene FOAM MAKING COMPOUND

THE PYRENE COMPANY LIMITED

9, Grosvenor Gardens, London, England. Cables: "Pyrene London"

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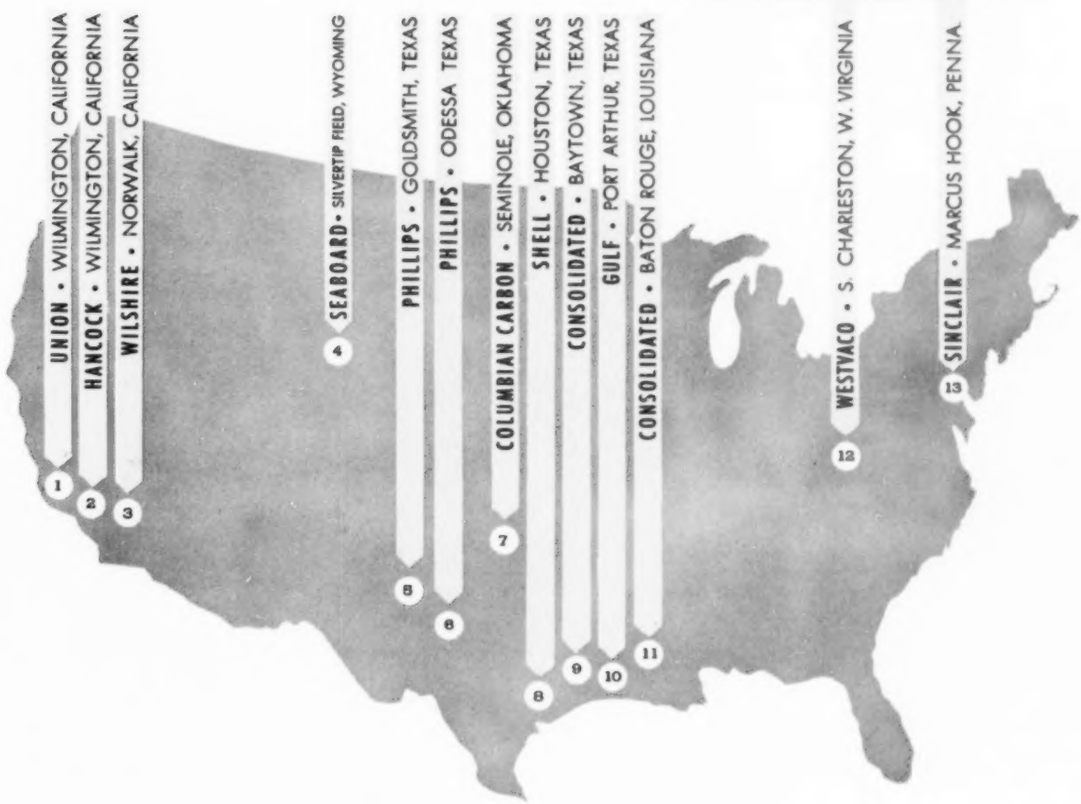
"We are continually making progress through chemistry, physics, engineering and all the related natural sciences. But it was never more clear than it is today that 'the proper study of mankind is man,' and that the most difficult issues we have to face are in the field of human relations... Our problems are more in getting along with each other than they are in conquering stubborn and mysterious natural surroundings."

STANDARD OIL COMPANY
(NEW JERSEY)
AND AFFILIATED COMPANIES

13 sulfur plants
designed & built by PARSONS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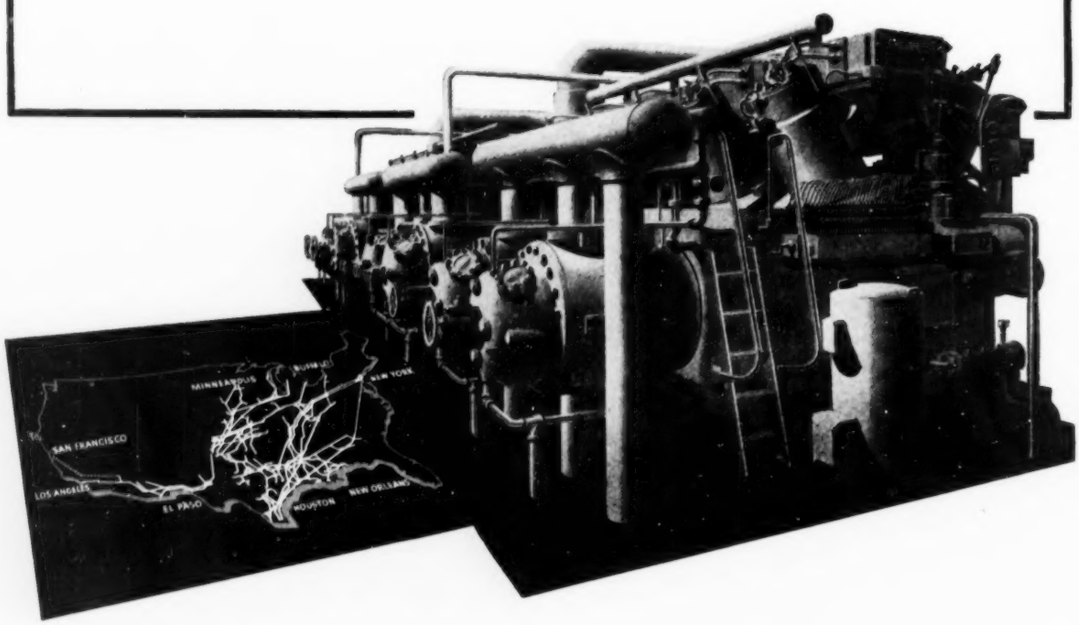

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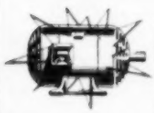

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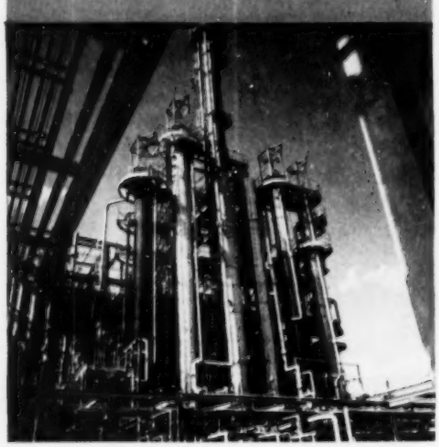

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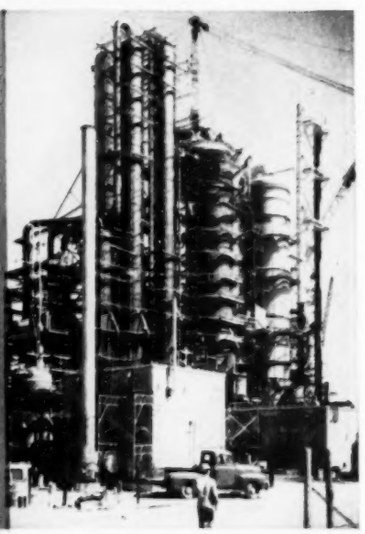

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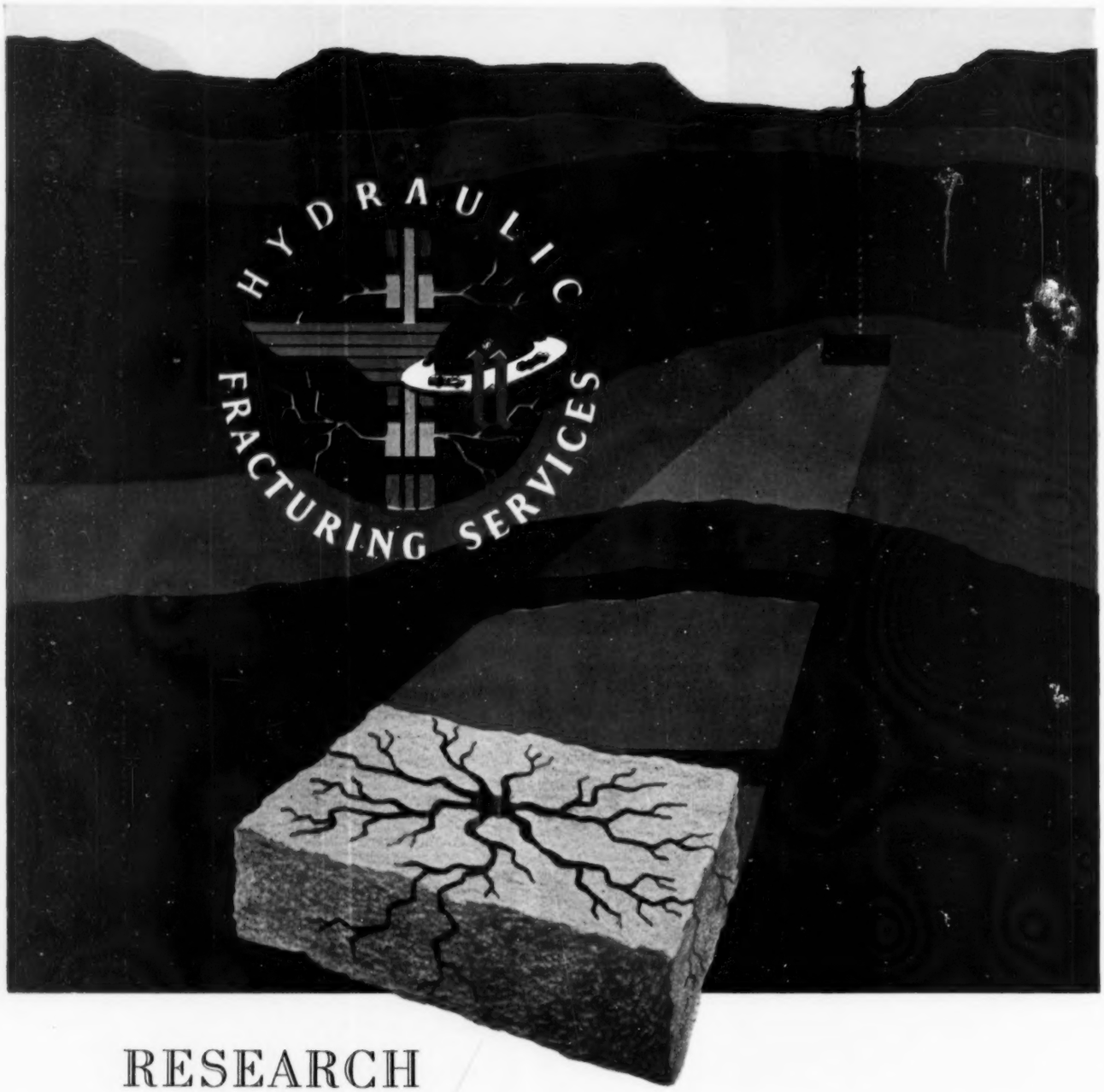
THIS MONTH'S COVER

Boilermaker chipping inside of reactor vessel at Shell's Dominquez, California refinery. Photo courtesy Shell Oil Co.



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"PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES"

HEARINGS SHOW NEED FOR OIL PRICE RISE

THE response of oil industry representatives who have appeared before the House Commerce Committee at the summons of Representative Wolverton, chairman of the committee, provides a simple and convincing statement of the reasons for the advances in the price of crude oil and products announced during the month of June.

Some of the salient facts bearing upon this subject as brought out in the testimony may be summarized as follows:

Prior to June 1953 no increase of any consequence had taken place in petroleum prices since December 1946. In that interval the general level of commodity prices rose 36 percent and many commodities had advances two or three times as great.

Costs of oil operation have increased steeply during this period. Practically all machinery and materials used by the industry have advanced from 30 to 85 percent, and wages are higher by 25 percent. In comparison with the increases in other fields, the advance of less than 10 percent in the case of petroleum is not only moderate, but is much less than is warranted by the increased cost of industry operation.

In late 1950, when it appeared that conditions were about to lead to a general rise in petroleum prices, the Director of Price Stabilization made a personal appeal to oil company executives to "hold the line" and not make price changes. Thereafter, in January 1951, the crude oil price was frozen by government authority at the level previously in effect and this control was not lifted until February 1953. During this time of static prices, the law of supply and demand was inoperative and oil prices were unable to respond to the normal influence either of growing demand or increasing costs.

If the industry is to maintain a healthy state, it is essential that production be found to replace withdrawals from existing wells and that new sources of supply be tapped to meet the constant growth of consumer demand. It is in this field that the most disturbing increase in operating costs has taken place.

To keep pace with the rising demand for its products, the oil industry must constantly expend vast sums in exploration, wildcat drilling to locate new fields and deeper penetration to open new horizons. As is well known, the finding of new reserves has become more difficult year by year. Five years ago 32 percent of all boring operations resulted in dry holes. By 1952 the ratio had risen to 40 percent, an increase of 25 percent in failures during these few years. In the case of exploratory wells, the proportion of dry holes is much higher, averaging 80 percent.

The depth of wells drilled in the United States has increased progressively since the start of the oil industry, and the cost of drilling rises in geometric rather than in arithmetic ratio as depth increases. Vice President Keeler of Phillips Petroleum Company testified from records of his company that a 13,000 foot well, instead of costing two and a half times as much as one with a depth of 5,000 feet, costs six times as much to drill.

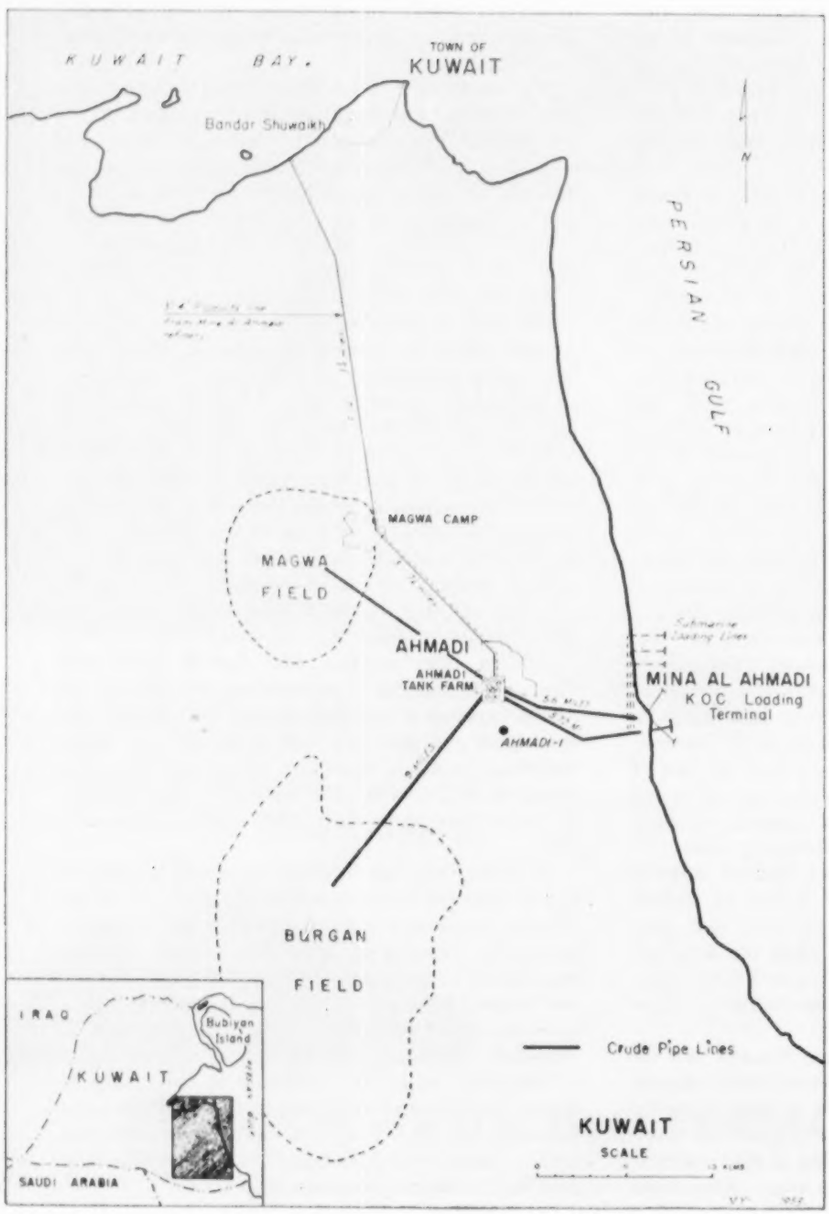
Not only is more extensive exploration needed to find locations suitable for drilling, along with the rising proportion of dry holes to each producer and the greater depths to which it is necessary to drill, but the size of the fields discovered by wildcatting grows smaller and smaller. Testimony before the committee showed that, comparing averages for five-year periods, there had been a decrease of 48 percent between 1943 and 1953 in the quantity of reserves discovered for each foot of wildcat drilling. It was stated in the course of the hearing that only one wildcat in a thousand finds a field capable of supplying the country for a week.

Taking into account the higher costs and diminishing returns of exploration and drilling, the added expense of production and distribution and the higher charges for a wide range of other items including taxation, lease and rental payments, the estimate that oil industry costs have increased by 50 percent or more since 1947 appears conservative.

A factor that has imposed an added burden on the oil industry is the demand repeatedly voiced by officials concerned with national security that a productive reserve of a million barrels daily be maintained to meet a possible emergency. To reach and support such a reserve capacity requires heavy investment and carrying expenditures on which no immediate return is possible.

Testimony thus far presented at the hearings makes an impressive showing of the need for more adequate returns from oil industry operations, both to meet current demands and to enable it to provide for future requirements.

Seven year rise has placed Kuwait among world's greatest oil fields



By E. Lawson Lomax

THE HISTORY of Kuwait Oil Co., Ltd., goes back no further than December 1934 when the concession was granted giving it authority to explore for oil throughout the territory of Kuwait. The rise of the country to a place of major rank among the oil producing areas of the world is even more recent, dating only from July 1946 when the first delivery of crude was made through submarine lines off the coast from Fahahil. In this brief seven-year period, Kuwait has taken a leading place among the producing countries that have made the Middle East known as probably the greatest of the world's petroleum provinces.

Kuwait Oil Co., Ltd., is jointly owned by D'Arcy Kuwait Co., Ltd., a subsidiary of Anglo-Iranian Oil Co., Ltd., and Gulf Kuwait Co., a subsidiary of Gulf Exploration Co. On behalf of the two owning companies, each of which owns an undivided one-half interest in the concession and the installations in Kuwait, the Kuwait Oil Co. Ltd. acts as operator.

As in many another field destined to win fame, the first well to be drilled in Kuwait was a failure. It was spudded in at Basrah on May 30, 1936 and was carried to a depth of 7,950 feet, but showings were so meager that it was abandoned. The story is told in Kuwait that an Arab lady had a dream that oil would not be found through the first drilling, but would be encountered if another well were put down near a certain lone tree growing out of the desert south of the Burgan hills, and that the lady so informed the local manager of the company.

Actually, the company, as a result of extended geophysical surveys, had decided on approximately this same location for its second test. It was here that oil was found in February 1938 at a depth of 3,672 feet. Those who prefer the romantic to the scientific system of oil discovery point to the tree still standing practically at the center of the Burgan field.

Following the discovery, development work continued until 1942. Operations were suspended until the close of the war in 1945 and then carried forward to the point where export shipments began in mid-1946. Since that time, the expansion of production has been as indicated by the figures in Table I on page 30.

The whole of this crude to date has been produced from the Burgan field in which a total of 131 wells has been drilled, average production depth being 4,650 feet.

The Burgan field is ovoid in shape, and measures about 14-15 miles in length by about nine miles in breadth at the widest point. Structure is domal. A typical Burgan well spuds in surface sands and gravels, then enters the Eocene at about 200 feet and the Cretaceous at about 2,700 feet. Some distance down into the Cretaceous an interbedded sand and shale series is encountered in which the sand members in on-structure locations are oil-bearing. Four sand pays were originally recognized, but two of these have since been consolidated, leaving only three. Water underlies the oil at a depth of 4,460 feet subsea.

A deep test has been drilled to approximately 13,800′ but no further commercial production was encountered; it was therefore plugged back to the producing zone in the Burgan series.

Analysis of Kuwait crude is shown in Table II on page 30.

Most of the present production at Kuwait is obtained from Burgan. However, an intensive drilling program is being carried out in the adjoining Magwa area, which was put on production early this year.

Here eighteen wells have been put down which are all potential producers, and drilling continues.

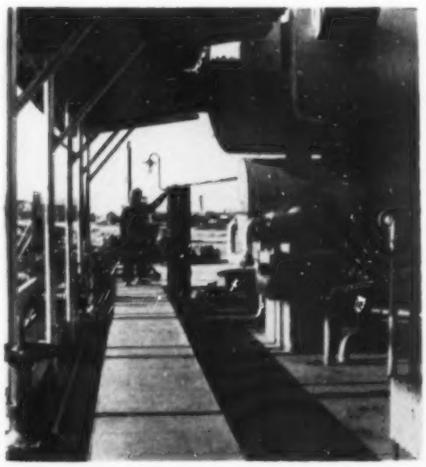
In addition, geological and geophysical surveys are being carried out in other portions of Kuwait, so that the possibilities of production elsewhere in the country can be estimated.

Owing to the nature of the terrain at both the Burgan and Magwa fields, it is possible to move the rigs from one well site to another without dismantling. The drilling rig in use is the National Type 50 rotary drawworks with a derrick 136 feet high designed to carry a load of 400 tons. The different parts of the outfit are mounted on skids for removal. Thus, much time is saved and the desired drilling program can be maintained by using three or four rigs. The time for drilling a well, ranging in depth to an average of 4,650 feet, is about 35-40 days, depending on the location of the structure. Production is obtained from three main sands. In each well the lower zone is being produced through the tubing and

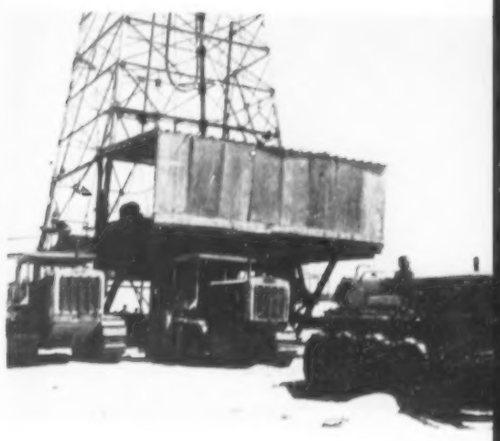
Instructor and Kuwaiti pupil at the training center.

General view of the Kuwait Oil Company's township of Ahmadi.

A general view showing the refinery, sea-water distillation plant, power house and oil loading pier at Mina Al-Ahmadi.



Section of the sea-water evaporation plant at Mina Al-Ahmadi.



Skidding a rig at the Burgan field.

either the middle or the upper sand through the annulus, utilizing a dual completion packer to separate the two zones. Some recent wells have been completed with cross-over packers.

The well head pressure averages 600 psi.

The Burgan field is divided into eight sections, each with its own gathering center, the gathering lines in each section being coupled to the wells, which range in number in the sections from 11 to 29. Gas/oil separation is carried out at each gathering center. The de-gassing plants each have a capacity of about 120,000 b/d and are of a special type developed for Middle East operations.

The well head pressure being 600 psi., the seven stages of separation are:

1st	stage	425 lb.
2nd	"	200 "
3rd	"	100 "
4th	"	60 "
5th	"	30 "
6th	"	12 "
7th (tanks)	"	1½ inches of water pressure

From the seventh stage separation the crude is pumped to the Ahmadi tank farm.

The flow lines are mainly of 6" diameter, the remainder being 2—4" lines, with an average length of 10,000 feet from well head to gathering center. There are safety valves at all well heads, which shut off the flow should the pressure on the downward side fall below a predetermined level, thus avoiding loss by line leakages or breaks. Each well is periodically tested through an individual 4-stage separator, with a capacity of 15,000 b/d to determine production rates and also the gas/oil ratio. The total gas/oil production is measured through orifice meters and then checked against tests for final figures.

At certain gathering centers, the gas from the first stage separation is used in steam-type turbines to drive the centrifugal transfer pumps delivering the degassed crude oil to tanks at the gathering centers.

This gas is first heated to 225° F. in Foster-Wheeler type superheaters, which are fired with exhaust gas; it then passes to the turbines from which it is exhausted at 90° F. In this way, frosting is avoided and more efficient operation is obtained. At most of the gathering stations, Westinghouse turbines and Pacific pumps are installed to pump the crude from the 12 psi. stage of separation to the flow tank. From the gathering center tanks, the crude is pumped along 3—20" transit lines to the main storage tank farm at Ahmadi some ten miles distant. Each standard transit pumphouse is equipped with three United Ironmarks pump units each driven by a 675-hp Cooper-Bessemer gas engine and each with a rated throughput of approximately 60,000 b/d. The latest commissioned pumphouse, however, is equipped with Allen gas turbines and Mather and Platt pumps of approximately the same rated throughput.

Part of the gas is transported to Mina al-Ahmadi where it is used as fuel for the refinery and main power station. Part of it is used in Cooper-Bessemer engines for pumping crude oil to the Ahmadi tank farm. Other uses are as fuel in the 600,000-gallon per day water distillation plant, in the machine shops, for domestic use in cooking and in winter for heating. For sea water distillation, power generation and domestic use in Kuwait town, the demand is likely to be substantial.

De-gassed oil ready for export is stored in the main tank farm at Ahmadi whence it runs by gravity to the tankers at the jetty and at the sea loading berths. For this purpose two 22" lines, three 24" lines and one 30" line are currently being used. Two additional 30-34 inch gravity lines are under construction.

Construction of the oil loading jetty was completed in November 1949, and a full description of it was published in this magazine.* It is one of the major engineering projects carried out by the company. It is of T-formation and runs 4,140 feet out to sea, the end of the T being 3,882 feet in length. Prior to the building of this jetty, when production was less than one-third the present output, tankers were loaded through five submarine line berths, but the jetty, in operation, obstructed further use of three of the submarine line berths and they were salvaged. Owing, however, to increased production, necessitating greater loading facilities, the two submarine lines remaining were brought into commission again. So great is the demand for shipping facilities that construction of three further submarine lines is now in hand.

The jetty itself, when first completed, provided for six oil loading berths and two cargo berths, but it has been found necessary to provide the cargo berths with oil loading facilities. Thus, at present there are berths at Kuwait for eight tankers to load simultaneously at the jetty, and for two at the submarine lines, making a total of ten, which will be increased to 13 when the three new submarine lines now building have been completed.

Repair shops have been erected in which all running repairs required on visiting ships can be carried out.

The refinery at Mina al-Ahmadi was put in action in November 1949 and was erected for the primary purpose of producing motor fuel and kerosine for local demands and to furnish bunker fuel oil and marine diesel oil for bunkering ships calling at the port.

* WORLD PETROLEUM, October 1950, p. 36.

Mosque built by Kuwait Oil Company at Ahmadi.

The topping plant was originally designed for 25,000 b/d throughput, taking off 45 percent of distillate and leaving a fuel residue. This throughput was later increased to 30,000 b/d.

The radiant section with ms tubes at the top and sides is heated with exhaust gas, while the convection section is fuel oil fired. This combination has been installed as a safety measure to avoid accumulation of unburnt gas should these burners, the flames from which are almost invisible, become extinguished. In order to avoid corrosion of the ms tube of the pipe still, an emulsion of caustic soda and ammonium sulfate is injected in small quantities into the incoming crude oil.

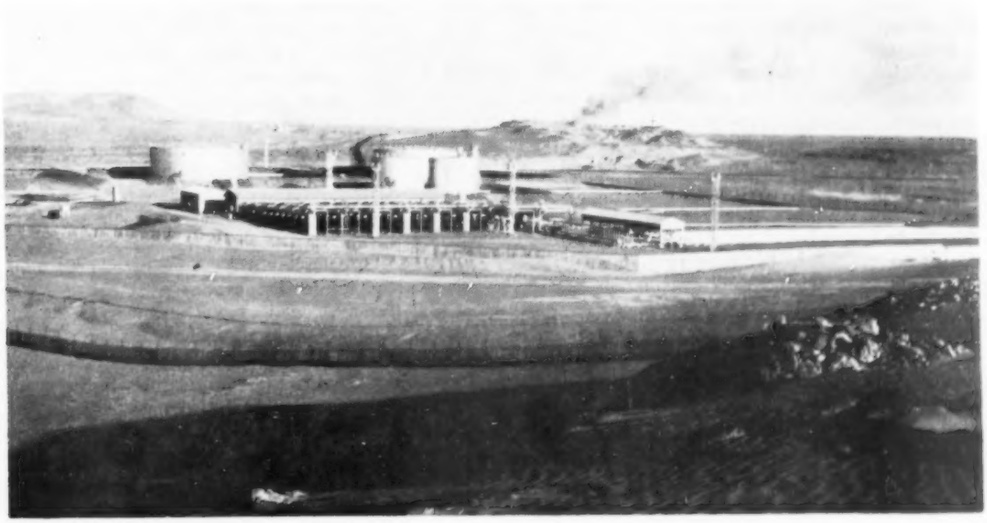
There are no naphthenic acids in the crude, nor is there any sulfuretted hydrogen present, the sulfur content being mainly concentrated in the heavy fractions.

The overhead gasoline with a final boiling point of 165°-170°C is doctor treated and leaded to 70-75 octane number. The kerosine is sweet and color-stable without any chemical treatment, the gas oil being water white.

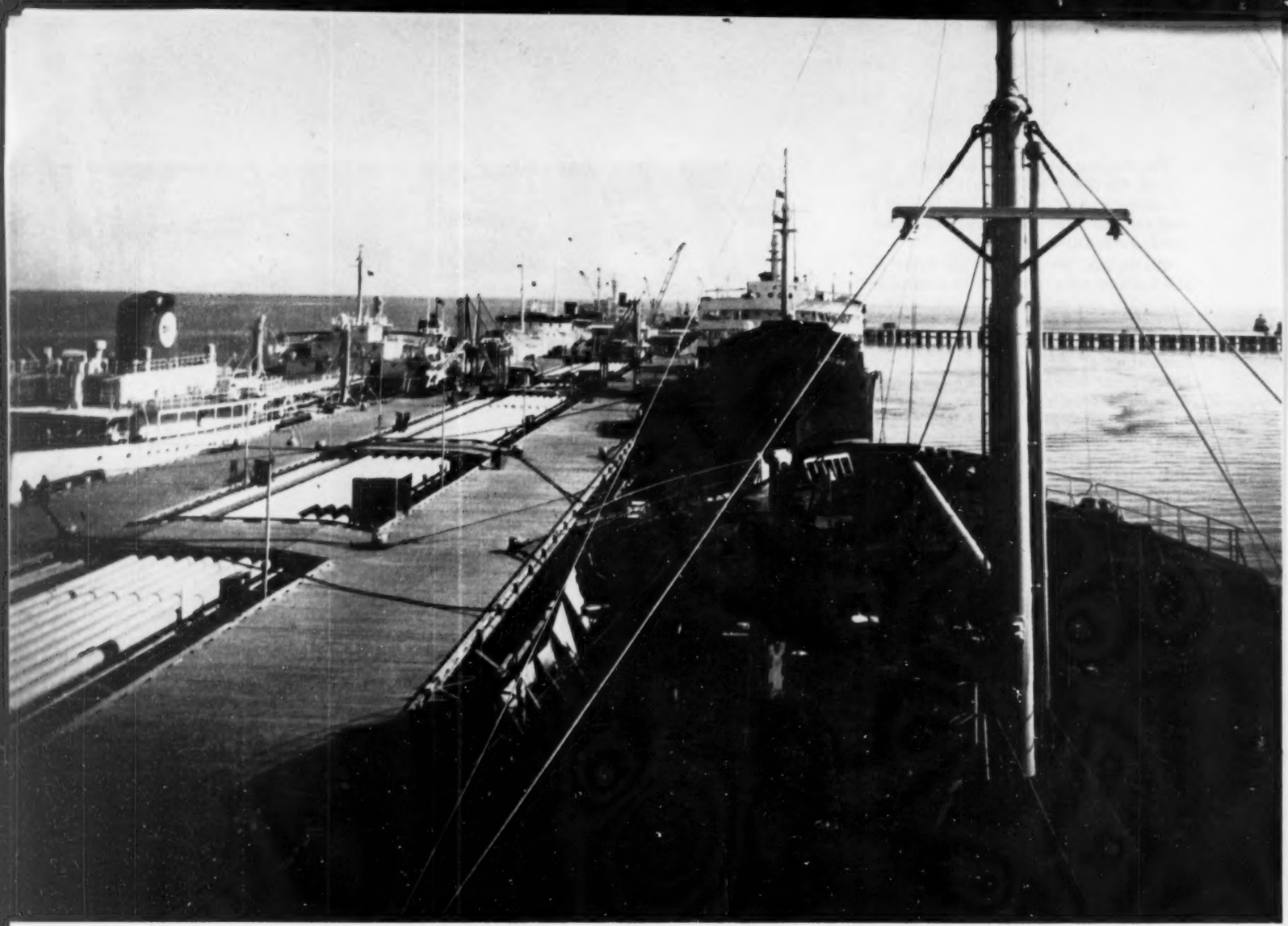
In addition to the topping unit a small asphalt plant, consisting of two continuous boiler stills working on vacuum with excess steam and made from two Lancashire boilers, is being built. The company has laid down many miles of asphalted roads, both for its own use and for the benefit of the State, and the asphalt plant supplies the material both for future construction and maintenance. Distillates from the asphalt plant are blended with the fuel residue as required.

A steam power plant is installed at Mina al-Ahmadi which performs the multiple purpose of supplying steam for the generation of power and for the sea-water evaporation plant as well as for the re-

Kuwaiti helpers at work on a rig at Burgan field.



General view of a gathering center in the Burgan field.



The pier head at Mina Al-Ahmadi, showing loading lines.

finery. The steam generation plant is composed of five 80,000 pound per hour Babcock & Wilcox water tube boilers, working at 210 psig, with steam superheated to a final temperature of 720° F.

These boilers are primarily fired by exhaust gas from the field separators, with alternative oil firing equipment.

For the generation of power, three 7,500 kw Westinghouse steam turbine driven alternators have been installed. These turbines are condensing, all condensate being returned to the steam plant. In addition, three 800 kw diesel generators which were installed for temporary power supply before completing the main power plant are used as standby supply.

Power is generated at 3,300 V. and is used at that voltage for all pumps of 50 hp or over. For pumps under 50 hp, this is stepped down to 440 V.

Steam for the sea-water evaporators and for refinery service is taken direct from the boilers, suitably reduced to operating pressures. Where necessary, as in the evaporator, it is de-superheated.

Distilled water from the evaporators, as fully described previously*, is conditioned for domestic purposes by the addition of up to 10 percent of brackish water together with certain chemicals to improve its potability. This brackish water is obtained from water wells sunk in the Abduliyah area some 15 miles west of the Burgan field. Distilled water from the evaporation plant is used in the boilers.

The main sea water pumphouse provides sea water for:

(a) Circulating water for the turbines and evaporator condensers.
(b) Feed water for the evaporators.
(c) Cooling water for the refinery, fire fighting water, requirements at Ahmadi.

For the above purposes there are:

(a) 4 centrifugal pumps of 550,000 gals per hour each.
(b) 3 centrifugal pumps of 175,000 gals per hour each.

The total pumping capacity is about 2¾ million gals per hour. The pumps are electrically driven centrifugals manufactured by the British firm of Gwynnes.*

Large workshops have been established at Ahmadi which are equipped for repairs and maintenance of all types of plant required in a large oil field as well as for motor vehicles, of which the company owns a large fleet for both passenger and goods transport. These workshops employ numbers of general fitters, gas and diesel engine fitters, electric and oxy-acetylene welders, electricians, sheet metal workers, pipe fitters, plumbers, carpenters, painters and bricklayers.

It is the policy of the company to train and employ Kuwaiti nationals for these services as well as for motor driving, plant operating and general utility tasks. It is impressive to see how far this policy has been carried when a visit is paid to the various workshops.

A complete system of permanent road communication has been established between Kuwait town, Ahmadi, Mina al-Ahmadi and the Burgan and Magwa fields. These roads are all asphalted or oil bound and compare very favorably with roads to be found in any other part of the world. Traffic with very heavy axle loads is common. The company's roads are continually being extended, particularly where new housing accommodation is being built and

* WORLD PETROLEUM, September 1952, p. 58.

Submarine loading lines on the beach at Mina Al-Ahmadi.

also as operations are extended generally.

One of the major projects is the new township of Ahmadi, where good living conditions are being established for all categories of employees. The houses for Arab workers are constructed of Basrah brick, each house being self-contained. They are two and three roomed houses, each with sanitation and bathing facilities. They are provided with electricity, running water and gas for heating and cooking purposes. They are also supplied with fans, and fittings for radio aerials are built in. These houses are at present occupied by Arabs of the skilled tradesman class. On the weekly leave days, which are Thursday afternoon and Friday in accordance with the Mohammedan religion, a bus service is run to Kuwait town about 23 miles away, in order that these employees may spend the weekend with their families, relatives and friends.

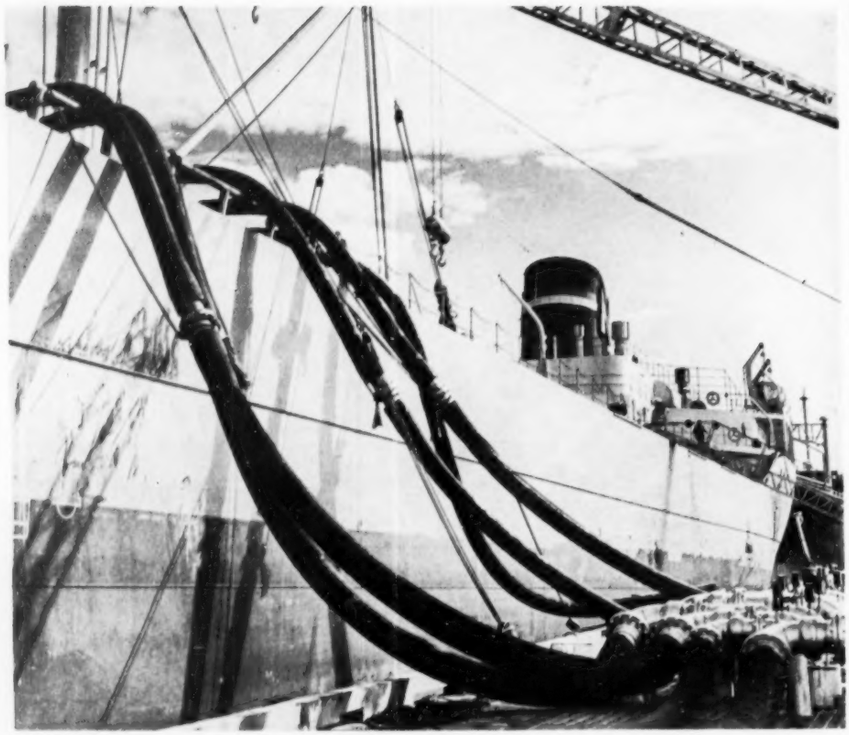
A large mosque has been built, and included in the planning are shops, medical clinics, clubs, reading rooms, coffee shops and sports fields, some of which have been built while others are in course of construction.

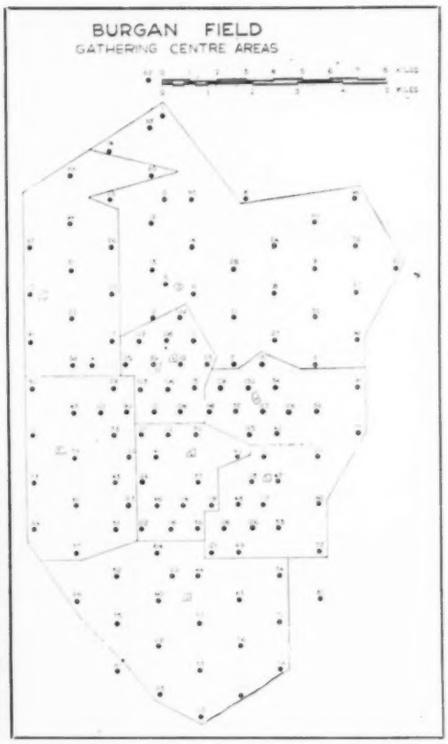
For generations the Arab has been an independent individual and in the past he was inclined to look down upon manual labor as an unworthy occupation, unless it formed one of the traditional pursuits. Until recent years, the inhabitants of Kuwait have been sailors, pearl fishers and traders, or have wrung a bare living for themselves by grazing their flocks and herds in the desert. With the sudden access of wealth to the country, due to the development of the oil industry, conditions of life are changing and natives are taking advantage of the wider opportunities now opening to them and their children. The training school for Kuwaitis run by the company has been a notable success. The State has plans to build a technical training school which will be one of the largest and best equipped to be found in the Middle East.

The construction of housing for employees brought in from Britain, America, India and Pakistan commenced in 1947. In the beginning, housing was naturally of a temporary nature. As production increased, however, so the provision of permanent housing became increasingly important; a program of housing was developed and is now well advanced. Houses for married staff to the extent of nearly 300 have been erected and more are under construction. These houses are detached, each provided with garden space; they vary in type and style and are allocated according to the requirements of the tenants. Some are built of concrete block and some are pre-fabricated wooden bungalows imported from Sweden, while others are built of Basrah brick. All these houses are air-conditioned in summer by a centralized chilling plant which can be converted to heating in winter. In addition there are nearly 100 permanent houses for clerks, foremen, technicians and their families, which are built of concrete blocks, are semi-detached and are also fitted with air-conditioning.

Another important section of the company's activities is that of catering for the particular food requirements of employees foreign to Kuwait. This entails the importation of the bulk of the food they require, since very little, apart from fish, is available locally. The commissariat department deals with this and also with the supply of meals in the various messes and canteens.

Married staff with their wives in Ku-





Tanker loading at the Mina Al-Ahmadi pier head.

wait, as well as bachelors who reside in small private messes, purchase their food from the company's retail stores as and when required. Bachelors who live in blocks of flats or in temporary camps take their meals in company restaurants, which in the main have a 24-hour service, the meals being paid for by food tickets at the time they are taken.

It is a pleasure to record that the writer had several meals in one of these restaurants and found the quality of the food, the cooking and the service to be of the highest class, fully comparable with what could be obtained in a high class restaurant or hotel in any other part of the world.

In addition to large amounts of preserved and frozen foods which are imported, two BOAC Dakota aircraft, on permanent charter to the company, bring in fresh fruit and vegetables from Lebanon, Syria, Iraq and other producing countries.

The company has inaugurated a nursery, where experimental work on the growing of trees and other plants can be carried out. Considerable progress has been made in the planting of trees along roads both for ornamentation and also as wind breaks, as well as in the layout of the company's gardens, both for homes and in open spaces. From 12,000 to 14,000 trees have been successfully planted.

The main requirement for successful agriculture in Kuwait is of course the provision of an adequate supply of suitable water. The water from the distillation plant is strictly conserved for domestic purposes and so agriculture has to depend on the use of water from wells. This water, being brackish, has to be carefully used, and so far, in spite of all exploration and drilling, no adequate supply of sweet water has been discovered.

Suggestions have been made that the lack of sweet water in Kuwait could be overcome by the cutting of a canal from the lower reaches of the Shatt al-Arab, above its junction with the Persian Gulf, to divert a portion of this outflow across Kuwait with a final outlet into the Persian Gulf at some point on the shores of Kuwait. This would be a large engineering problem, but funds for the project can be made available from the oil royalties now being received by the government.

Agreement to such a project would be a matter of negotiation with Iraq, within whose borders the Shatt al-Arab flows, based perhaps more on political than financial or economic considerations.

Rainfall in Kuwait is light, having averaged only 2.574" over the past six years, and the whole of it takes place during the cooler months between November and April. The maximum recorded shade temperature is 122° F. Average shade temperature in the summer is 112° F., and in winter this falls to approximately 40-45° F.

Life in Kuwait is very comfortable owing to the concern exercised by the oil company in providing modern houses and conveniences for the 1,900 members of its staff and its 6,300 artisans and domestic workers. The progressive attitude of the government in installing public improvements contributes to the contentment and well-being of all classes of the population who are pleased at their good fortune in being placed above one of the greatest of the world's oilfields.

TABLE I

CRUDE OIL PRODUCTION

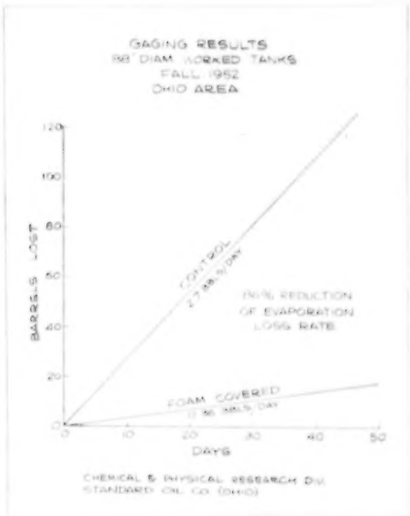
Year	Barrels	Tons	No. of Producing Wells
1946	5,927,979	797,350	8
1947	16,227,906	2,185,309	13
1948	46,546,795	6,291,577	31
1949	89,930,444	12,183,669	61
1950	125,722,396	17,018,666	78
1951	204,909,662	27,783,170	109
1952	273,432,895	37,042,122	126
	762,698,077	103,301,863	
1953 (5 mos.)	27,509,709	3,765,784	

TABLE II

ANALYSIS OF KUWAIT CRUDE

		Method of Test	Results
Gravity	°A.P.I.	Calculated	31.7
Specific Gravity	60°F./60°F.	I.P. 59/45	0.867
Distillation Test			
I.P.B.	°C	I.P. 24/44	49
Volume at 50°C (122°F)	%	"	0.5
" " 75°C (167°F)	%	"	3.5
" " 100°C (212°F)	%	"	7.5
" " 125°C (257°F)	%	"	12
" " 150°C (302°F)	%	"	16.5
" " 175°C (347°F)	%	"	21
" " 200°C (392°F)	%	"	25.5
" " 225°C (437°F)	%	"	29.5
" " 250°C (482°F)	%	"	34
" " 275°C (527°F)	%	"	38.5
" " 300°C (572°F)	%	"	42.5
Total Distillate	Vol. %	"	43.5
Residue	"	"	55
Loss	"	"	1.5
Sp.Gr. of Distillate	60°F./60°F.	I.P. 59/45	0.759
Sp. Gr. of Residue	"	"	0.955
Sulfur Content	Wt. %	I.P. 61/45	2.49
Viscosity Centistokes at	30°F.	I.P. 71/47	42.5
" " "	70°F.	"	15.3
" " "	100°F.	"	8.5
H_2S (Dissolved)	Wt. %	A.I.O.C. 269/49 (mod)	Nil

Plastic microballoons employed to reduce storage losses



EMPLOYMENT of plastic microballoons as a foam blanket on stored oil to reduce evaporation is being studied currently by the chemical and physical research division of Standard Oil Co. of Ohio. Preliminary results indicate that the blanket has a long life in service and that it will reduce evaporation by 80 to 90 percent in cone roof tanks.

Layers of the microballoons in thicknesses of one half to one inch have been successful. Application to the oil in storage is simple, requiring little change in the tank. The fluidity of the foam layer enables it to flow around supports, swing lines, and other deadwood in the tank while keeping the liquid surface sealed as the level moves up and down. The "microballoon" layer acts as a sort of fluid roof and serves to decrease substantially the evaporation losses in crude oil storage.

The difficulty of reading a gauging tape properly in the presence of a layer of viscous foam is adequately handled by the use of a simple protective floating well attachment on the tape line. In a number of cases the floating wells have been permanently installed in the tanks.

In general, it appears that the conditions which increase evaporation losses, such as higher storage temperatures, poor tank conditions, frequent working and others, are the ones which increase the relative value of microballoons as a conservative technique. Tests with worked and static tanks of various sizes and conditions support the general performance effectiveness outlined above.

Microballoon coverings have been installed with the simple technique of pouring the dry powder through open hatches. Usually some form of surface agitation or an oil spray has been used to help spread the covering initially. The type of equipment used to blow insulation into walls is currently being investigated as a handling technique with promising preliminary results.

Accidental loss of the microballoon covering into a pipe line will not disrupt the pipe line operation. The particles are so small (present product averages 0.001 inch in diameter) that liquid suspensions can be pumped through precision pumps without damage. Hydraulic pressures of a few hundred pounds in the pipe lines are sufficient to collapse the microballoons, making them even smaller. They would eventually end up in the tank BS&W. This would also be true of coatings which deteriorate in service in the tanks.

It has been found that microballoons substantially reduce the concentration of hydrocarbons in the tank vapor space. The normal vapor composition in storage tanks varies all the way from too rich to burn inside the tank to too lean, depending upon a variety of factors. Since the microballoon covering invariably reduces the hydrocarbon concentration, in some cases it will make vapor space less dangerous, in others more dangerous. Whether there will be an average gain or loss on the vapor space combustibility is not yet known.

Most of the large-scale test work has been done with a one-inch thick layer of microballoon foam. The optimum thickness is not yet sharply defined. For large tanks it will probably be in the region of one half to one inch. For a given thickness of foam layer, the quantity of microballoons required is proportional to the square of the tank diameter. For the product currently being used, the following quantities are needed for one-inch foam layers:

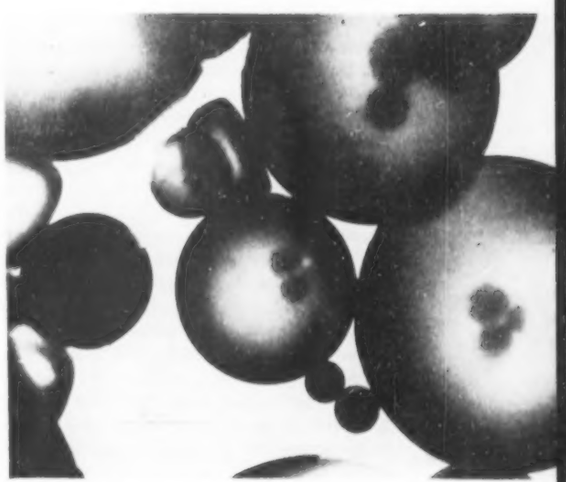
TANK DIAMETER	POUNDS OF MICROBALLOONS
20 feet	250
50 feet	1600
100 feet	6000

Microballoons are small, spherical, hollow particles, usually made of plastic, containing sealed-in gas at about atmospheric pressure. The general characteristics of the material can be varied over considerable ranges of size, density and composition. Typical properties of a material currently being extensively field tested are as follows:

Bulk density	8.7 lbs./cu. ft.
Particle density	20.6 lbs./cu. ft.
Average particle size	0.0013 in.
Size range	0.0002-0.0036

This particular product is made from a phenolic resin and the sealed-in gas is essentially nitrogen.

Up to the present time microballoons have been manufactured and tested on an experimental basis but are expected to be available in quantity within a few months. Experimental samples can be obtained from Sohio. Price of the new product is not yet determined, but a preliminary figure of 80c per pound has been used for economic calculations.



An electron microscope photograph of "microballoons."

Researcher Richard D. Craft in the chemical and physical research laboratory of Standard Oil Co. (Ohio) measuring float of "microballoons."

The Sohio research team that developed the "microballoons." Left to right: Richard D. Craft, Dr. Frank Veatch and Ralph W. Buchans.

WASHINGTON DATELINE

Oil price hearings follow usual pattern

By Joseph Huttlinger

IN INAUGURATING the current series of oil hearings being conducted by the House Committee on Interstate Commerce, Representative Wolverton of New Jersey, chairman of the committee, announced that the purpose of the proceedings was to inquire into the reasonableness of the advances in crude oil and petroleum product prices announced late in June. In this connection, he propounded a series of questions he wanted to have answered by representatives of the oil industry.

Though heavily slanted to indicate that in the chairman's opinion the price increases were not justified, the inquiries related to the particular raises made during the past several weeks, as to whether they reflected the operation of normal factors of supply and demand, how it happened that an advance posted by one company was immediately paralleled by a number of others, and how an increase can be justified at a time when stocks are high and when reserve producing capacity is estimated at a million barrels a day above the actual rate of output.

While the investigation as outlined raised no new issues, the start of the hearings was seized upon by professional critics of the oil industry, by the advocates of government control of all industry, and by those who feel that the cheapest form of political capital is an assault upon the oil business and the men who conduct it, to bring out all the shopworn charges that have figured for years past in the many fishing expeditions conducted by government agencies into oil industry operations. The charges made have ranged from assertions that price changes represent a conspiracy among the oil companies; to attacks upon the regulatory systems of the oil producing states and the depletion allowances for expenses of exploration and drilling; to demands for prosecution under the anti-trust law; and dismemberment of integrated companies or establishment of a federal commission to regulate the industry from top to bottom, including control of prices.

This type of criticism was stressed by the first witness to appear, Paul E. Hadlick of the National Oil Marketers Association, who told the committee:

"It seems quite clear to me that the time has come for the Congress to repeal the Connally (Hot Oil) Act, withdraw its approval of the Interstate Oil Compact Commission, and prohibit the Bureau of Mines from laying out a pattern for the control of the production of crude oil."

Hadlick had previously asked that the Justice Department investigate "collusion" among oil companies in the price rise, evidence of which, he said, was the rise in prices in the face of big supply, and the fact that one company followed another in the rises.

A dozen or more oil company officials who had been summoned to Washington by Chairman Wolverton have appeared before the committee and endeavored to answer the questions propounded by the Congressman in his public statement. Summarized, their testimony presented the following facts:

(1) The price increase in crude oil and products was the first that has taken place since 1951 and the first of any size in nearly six years. In the meantime the price of everything else, including everything that enters into oil industry costs, has gone up in far greater proportion than the small increase, well below 10 percent, in crude oil and products.

(2) The cost of producing petroleum rose by 40 to 50 percent during the six-year period, with increased costs for steel, labor and other materials. A crude oil price rise of $1.25 a barrel, instead of 25 cents, would be required to restore oil to its 1947 position.

(3) The task of finding petroleum in the United States becomes more and more difficult year by year. To maintain reserves and to keep step with the growth in domestic demand, more and deeper wells must be drilled. To get these extra wells a greater price incentive is needed.

(4) The economic law of supply and demand was not operative during the years of government fixed prices and the gradual price readjustments which otherwise would have taken place were not possible. Financial reports of oil producing companies reflect the influence of frozen prices. An analysis of financial returns of eight companies producing oil only in the United States shows a reduction of 40 percent between 1948 and 1952.

(5) While the immediate supply picture is one of adequacy, the long-run picture is one of shortage under rising demand combined with government pressure for the industry to carry a reserve productive capacity of a million barrels daily. To finance a reserve of such dimensions and to provide new supplies calls for a greater price incentive.

(6) Oil industry officials were unanimous in denying that prices were raised by agreement among the companies. When one company decides to raise or cut prices, its competitors determine independently whether or not they will adopt the same course. An attempted price change up or down may stick or it may fail, but it is obvious that, in the case of a staple commodity such as gasoline or lubricating oil, the local service station cannot successfully maintain prices higher than neighboring sellers of exactly similar products, and if his prices are lower he will not be able to obtain needed supplies.

Succinctly expressing the oilman's view was the statement made by Hines H. Baker, president of Humble Oil and Refining Co., largest producer in the United States with 350,000 barrels daily:

"The striking fact is not that an increase in crude oil prices occurred," said Mr. Baker. "It is that the increase came so late and was so much less than the change that has occurred in costs since the preceding advance of December 1947."

Russell B. Brown, counsel of the Independent Petroleum Association of America, said:

"With regard to crude oil prices, the need for an increase has been obvious for a long period. Our association has played an active part in making this fact known throughout the period of price controls and the months that followed the removal of these controls. For the past five years and since the beginning of the Korean war the oil producers did not contribute one cent toward the inflation that has taken place in this country. No other industry has such a record. The hearings on price increases, if all the facts are understood, will show that the increase in crude oil prices is inadequate rather than excessive."

Strong protest against the suggestion that the advance in product prices should be rolled back while the increase in crude

is permitted to stand was filed with the committee by Paul Blazer of Ashland Oil and Refining Co. and Reid Brazell of Leonard Refineries, Alma, Mich. They pointed out that such a course would drive out of business the independent refiners who purchase their crude in the open market and have to sell products at whatever may be the current rate. They obviously would be unable to absorb the increased cost of crude as might be done to some extent by the big integrated companies having production, transportation and marketing divisions.

Discussions in the hearings during the early sessions have resulted in the production of a preponderant mass of testimony in support of the need for the higher prices recently announced for crude and products on the basis of the sharp advances in operating costs including wages and materials and the steadily growing cost of finding new petroleum reserves to replace current withdrawals. At the same time, the comments of committee members who have been most active vocally and the tone of their inquiries directed to witnesses have revealed an ingrained feeling that the oil industry is prosperous enough to get along without additional revenue and that the supply situation does not indicate the existence of an emergency requiring a price incentive to stimulate exploration and production.

If and when the committee issues a report, it appears likely that it may contain criticisms of the oil industry and that these may extend to certain state and federal agencies and to cooperative state activities such as are represented by the Interstate Compact. In the immediate future, however, no legislative changes are in sight and there is no present indication as to whether such changes will be recommended by the committee. In general, the hearings are held to serve a useful purpose in putting on record the facts in the present and prospective situation of the oil industry. No new issues were raised in the hearings, though as usual a considerable amount of old straw was threshed over and time-worn charges against the industry were aired. The one specific outcome of the investigation thus far has been Representative Haselton's bill for complete governmental regulation of the oil industry.

Many changes in PAD personnel

JOSEPH A. LAFORTUNE, 59, vice chairman of the board of the Warren Petroleum Corp., Tulsa, Okla., is the new deputy petroleum administrator. He took over, effective July 1, from J. Ed Warren of Midland, Texas, who had served PAD for 15 months, and now returns to his oil production operations in Texas.

Mr. LaFortune, a native of South Bend, Indiana, attended Notre Dame University and has been a member of the Board of Lay Trustees for several years. In 1946 he turned over to the University securities which are now worth $140,000. The University is remodeling a building with the funds to serve as a recreation center and will name it the LaFortune Student Center.

Mr. LaFortune joined the Warren Company in 1924, was elected a vice president in 1929, and later was made executive vice president. The company operates natural gasoline plants in the Southwest and is a leader in this branch of the oil industry.

During his service in Washington, Ed Warren made many friends in addition to his previous wide acquaintance. Before leaving, he was guest of honor at a banquet given by the staff of PAD and another given by the National Petroleum Council. Upon taking his departure with Mrs. Warren for an ocean cruise, the retiring deputy pointed out to Secretary of the Interior McKay the continuing importance of "government-industry understanding and cooperation," and suggested that "advice on oil problems from oilmen recruited from the industry will be of great value to you."

In his response, thanking Mr. Warren for the "valuable contribution" he had made during his term of service, the Secretary added:

"It is heartening to know that we have in your successor a man with broad petroleum experience who will be able to carry on the fine work that you have been doing. I appreciate your offer of assistance and I shall keep in mind your comment."

Other shifts in top jobs at the PAD, as one industry man completes his service and another takes over, include these:

C. E. Davis has resigned as associate deputy administrator, after 23 months service, and returns to Shell Oil Co., N. Y., where he is vice president in charge of refining. R. Rea Jackson, who comes from Socony-Vacuum Oil Co., has taken Mr. Davis's place.

Paul E. Kuhl of Esso Standard Oil Co. has been named director of PAD's refining and natural gasoline division, in addition to directing the foreign refining division. He takes over a post left vacant with the promotion of Mr. Jackson.

J. E. Brantly, former president of Drilling and Exploration, Inc., has left as assistant deputy administrator for foreign operations. David H. West, formerly with Standard Oil Co. (N.J.), has taken his spot.

Richard E. Nelson, Jr., has resigned as head of the supply and transportation division to return to Standard Oil Co. (Ind.). His PAD post may be left vacant under the streamlined setup ahead.

Harris Bateman, head of the materials division, has resigned to return to Cities Service Oil Co., Bartlesville. Emmett Vaughey of Jackson, Miss. has resigned as head of the production division to return to oil production operations.

Bryant Putney, director of the public information division, has resigned to join the public relations staff of Socony-Vacuum Oil Co., N. Y. Arthur R. Kuhl, his deputy, is moving into the information spot.

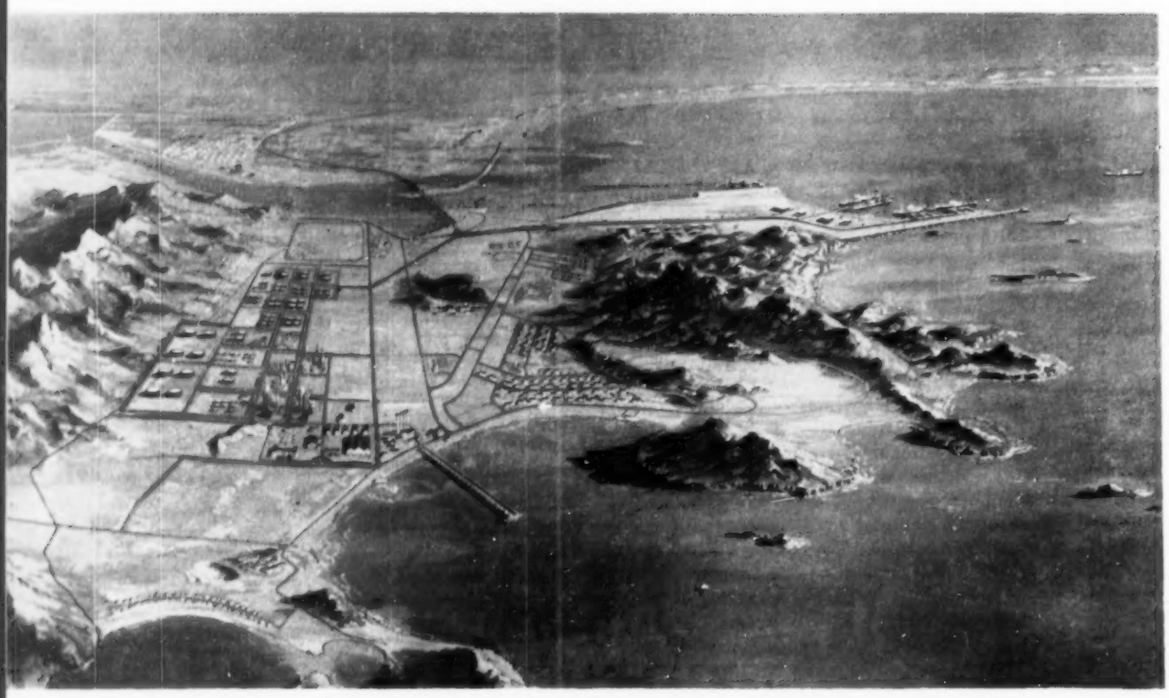
William Simon has resigned as general counsel to enter law practice in Washington. Harold P. Reynolds, Chicago lawyer, is taking the legal post at PAD.

Elihu Madison, manager of the economics department of The Texas Company, will become director of the program division of the Petroleum Administration for Defense on August 16, Deputy Petroleum Administrator LaFortune has announced.

William F. Kirk, assistant manager of General Petroleum Corporation's economics department, will become assistant director of the program division on August 16. Mr. Kirk is presently serving as special assistant to the director of the program division.

James S. Weatherby, a senior research economist for the Atlantic Refining Company, Philadelphia, has been named chief of the domestic petroleum branch of the Petroleum Administration for Defense. He will replace Joseph Hall, who is returning to his position with the Phillips Petroleum Corporation.

Site preparation at Aden



An artist's impression of the Anglo-Iranian Oil Company's new oil refinery at Little Aden, six miles west of Aden town.

Looking along the coast on the Port side. The lagoon on the left will be filled in. The road in the center is the marine drive and has recently been won from the sea. "White Ness" quarry is shown at the far end of the road.

INVOLVED in the development of a refining center at Aden, in which the Anglo-Iranian Oil Co. Ltd. is now engaged, is not only the erection of a great modern processing plant capable of handling a daily throughput of around 100,000 barrels, but also the creation of a fully equipped oil harbor, the building of a town with extensive housing facilities and the necessary municipal works. The cost of site preparation and construction is estimated at $17,000,000 or more.

The location of this undertaking on one of the great marine highways of the world was determined after careful study as affording a favorable position for the reception of crude and for the shipment of products both to east and west. It makes the enterprise one of the highly important developments in the realignment of refining facilities now taking place throughout the world.

The site chosen is on the Little Aden peninsula, about eight miles from Aden town by sea and 28 miles by land. Prior to the commencement of the oil company's operations, the area was totally undeveloped except for a small fishing village of about 500 inhabitants. The area acquired consists of about 270 acres, of which the oil port itself will occupy about 50 acres. It is on the eastern shore of the rocky promontory of Little Aden, on the western side of Bandar Tawayih, south of the entrance to the Khor Bir Ahmed. Since November 1952, this district has been a scene of bustling activity as a galaxy of material handling machines and a battalion of workers, mainly British nationals, have moved ahead with the preliminary work of harbor construction and site preparation. The task is in the hands of the Middle East Bechtel Corp. and George Wimpey & Co. Ltd., the British affiliate of Bechtel.

Prior to the start of construction, a study of the terrain showed that the land was suitable for building purposes and that an ample fresh water supply for processing and domestic needs could be made available by drilling within a reasonable distance. A problem that presented itself in connection with the

start of actual construction was that of providing quarters for the first contingent of some 150 Wimpey employees, since nothing was available on shore. This was solved by chartering the liner "Dorsetshire" which served as a floating camp until a number of prefabricated houses could be placed in position. As soon as housing for some 100 European personnel had been placed in position, the "Dorsetshire" was released and allowed to go back to regular line service while camp expansion to accommodate another 1,200 employees proceeded.

The main work of harbor construction includes:

(a) A breakwater about 3,700 feet long and a bund about 9,000 feet long. The area enclosed by these will serve as a site for the port buildings and installations after being filled with sand dredged during the deepening of the harbor and its approaches to a depth which will allow the accommodation and handling of the largest tankers.

(b) Dredging of the harbor and its approaches to a low-tide depth of 40 feet.

(c) The construction of three oil jetties, one with two berths and two with single berths.

Rock for construction of the breakwater and bund is obtained from three quarries on the mainland, about 1,200,000 cubic yards being required.

The cores of both breakwater and bund will consist of rock ranging as quarried from about 15 pounds to two tons in weight, and this material is tipped straight into position by large dump trucks. The tipping of the rock will have a natural angle of repose, and a cross section of it will be triangular in shape with the apex of the triangle sheared off.

The breakwater will be armored on the seaward side with two layers of blocks of rock, the lower and inner one consisting of blocks of five to eight tons in weight, and these will be placed in position by large crawler cranes standing on the flat top of the core.

The landward side of the breakwater will be sealed with layers of crusher run material to prevent the dredged material used for levelling up from percolating through. A concrete wave wall will be built on the breakwater after all rock has been placed.

The 9,000-foot bund will not be rectilinear, but will follow a line conforming to coastline requirements and will join the breakwater at the sea end at practically right angles. The construction of the core will be carried out in a similar manner to that of the breakwater, but the armoring required will not be so heavy, consisting of a thinner layer of two to five ton blocks placed in position in the same manner as the armoring for the breakwater. The landward side will also be sealed against percolation of the dredged filling material.

The oil jetties will be built against the bund, and will consist of one two-berth finger jetty and two one-berth T-head jetties, all designed to accommodate tankers up to 32,000 dwt. In addition there will be a cargo jetty. For the construction of these jetties, steel piles 90 feet long and of a modified Larssen box-type section are to be used.

Owing to space limitations, these piles will be shipped in halves and welded together on site and then given a bitumastic coat prior to driving. The vertical piles will be driven from floating craft and the raking piles for the dolphins and

A line of 10-ton tipping trucks awaiting fill.

The first huts of the nationals' construction camp.

The temporary stores area showing pioneer stores, warehouse, and Wedge Hill quarry.

in the jetty heads will be driven from the docks which will be constructed before the raking piles are driven.

Landing plates will be welded onto the heads of the piles and the steel deck beams of the jetties will be bedded onto them, after which they will be secured by casting blocks and concrete around the ends of the beams and piles and landing plates. The decks of the jetties will be of reinforced concrete slabs. Rubber mounted fenders will be incorporated in the jetty heads. Galleys and smoke rooms for tankers' crews will be built at the landward end of the jetties.

Construction of the oil harbor is in charge of George Wimpey & Co., with Rendel, Palmer & Tritton as the supervising engineers, but the dredging is being done by a specialist firm, K. L. Kalis Sons & Co. Ltd. in association with the Dredging and Construction Co. Ltd. under a direct contract with the Anglo-Iranian Oil Co. Ltd.

The site chosen for the erection of the refinery is a sloping, fairly level plot of some 270 acres, on which no piling will be required for the foundations of the refinery units, but terracing and grading will be needed to the extent of moving about a million cubic yards of earth as cut and an equivalent amount of fill. The foundations for the power house at Khor Gahadir will be placed on Raymond step piles. These are tapered stepped hollow steel shells which after driving are filled with concrete.

The plant foundations will be of reinforced concrete, and tankage will be erected on a pad composed of crushed rock. Six million barrels of tankage is budgeted which will be fabricated and erected by Chicago Bridge & Iron Co. All pipe work will be fabricated and welded on site. For this purpose two million feet of piping has been purchased from the United Kingdom, United States, Italy and Australia.

One of the major operations in the preparation for erection of the refinery is the building of the construction camp for the housing, feeding, and general welfare of all types of construction personnel, as well as the provision of workshops, repair depots, and plant to provide the required power and lighting during construction.

The camp for the imported staff, which is drawn mainly from the United Kingdom, United States, and Italy, is located close to and directly south of the refinery site and that for the Middle East nationals is located directly west of the refinery site.

These camps will have a total of about 250 buildings, including dwellings, workshops, storehouses, hospital, recreation rooms, laundry and others.

The construction camp for the imported staff will consist of 85 prefabricated, two-bedroom family bungalows, built on the Riley-Neusum principle, nine barrack-type buildings to house six each of the senior bachelor staff, and 118 barrack-type buildings to house 26 each of the junior staff. These buildings will house altogether over 3,000 persons. All will be fully air-conditioned as will all the subsidiary buildings in the camp.

For the feeding of the bachelor staff, two large mess halls are being erected, one for the British and American staffs and the other for the Italian staff. Attached to these mess halls will be commissariat department and kitchens, supplied with the most modern cooking equipment and cold storage facilities, together with shower and changing rooms for the serving personnel. These mess halls are pre-fabricated steel buildings purchased from the United Kingdom.

In addition to the mess halls, there are two large recreation buildings which are fully air-conditioned and are equipped with a large lounge, library, billiard and card rooms, barber shop, and post office.

Attached to the commissariat department in this section there is a bakery, butchery, laundry and cold storage for food in which plant ice and ice cream

Cathedral Hill, Sugar Loaf in Silent Valley. Note PRL Land Rover in the foreground.

are made. The cold storage is designed to accommodate food for 1,000 men for two months, and is one of the largest cold storages in the Middle East.

A camp chapel has been provided which is a pre-fabricated wooden building, fully air-conditioned and with living accommodation for a resident padre. There is also an open air cinema theatre with seating for 740, and also a small stage for concerts, plays or other entertainment.

The camp for Middle East nationals has accommodation for 11,000 men and is expected to cover requirements over the peak construction period. The camp is divided into four sections according to labor skill. Each section is provided with a bakery, fire station and police post. At some distance north is an abbatoir where the sheep required to supply fresh meat to the workers are slaughtered, some 250 sheep per day being required for this purpose.

Common to the two construction camps are the services supplied by the hospital, power station, fire brigade and water supplies. The hospital, which is presently a 150-bed organization with an ultimate capacity of 240, is located west of the main personnel camp on the face of a hill overlooking the sea. Aside from its complete nursing and surgical equipment, kitchens and dining rooms are included to supply the various kinds of food required in such a mixed community.

The power generating and distributing equipment consists of 4 x 1,100 kw diesel driven generators supplied by General Motors, 4 x 440 kw diesel driven generators supplied by Brush Export group, and 2 x 700 kw diesel driven generators supplied by Brush. In these latter six sets National Diesel Engines and Brush generators are embodied.

Power is generated at 3.3 kv, 50 cycle, 3-phase and is stepped down at substations to 440 volts, the total power being 7,800 kilowatts. Distribution is by underground cables, which are sheathed with polyvinyl chloride, the ground being salt laden and thus very corrosive.

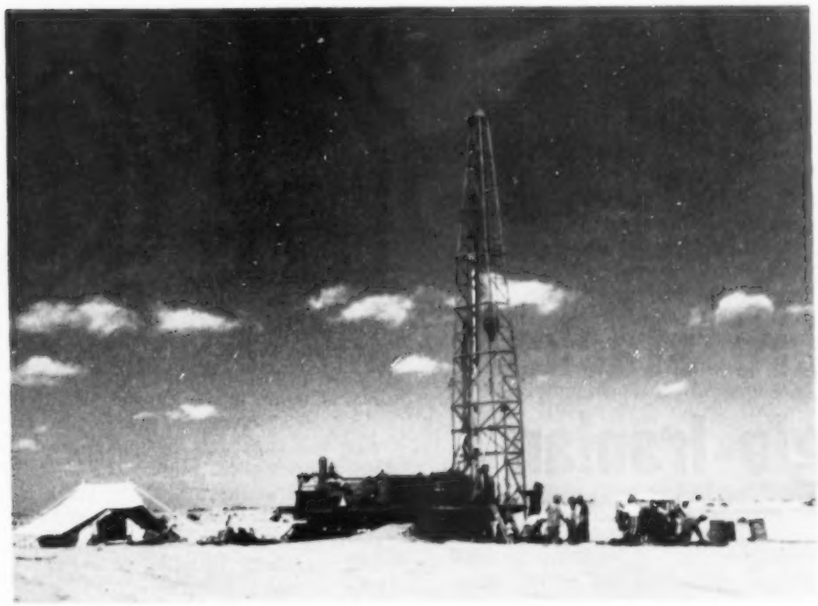
In construction of the oil port, a large amount of dredging will be required. Dredged sand will be pumped onto the foreshore to provide a flat area for port and other buildings.

Construction of the refinery itself will follow completion of the preparation work now under way. The major plant will include two atmospheric distillation units complete with stabilizers and soda washers, one Platforming unit and one sulfur dioxide extraction unit. The installed capacity of the power station will be 22,500 kilowatts, while that of the boiler battery will be 600,000 pounds per hour.

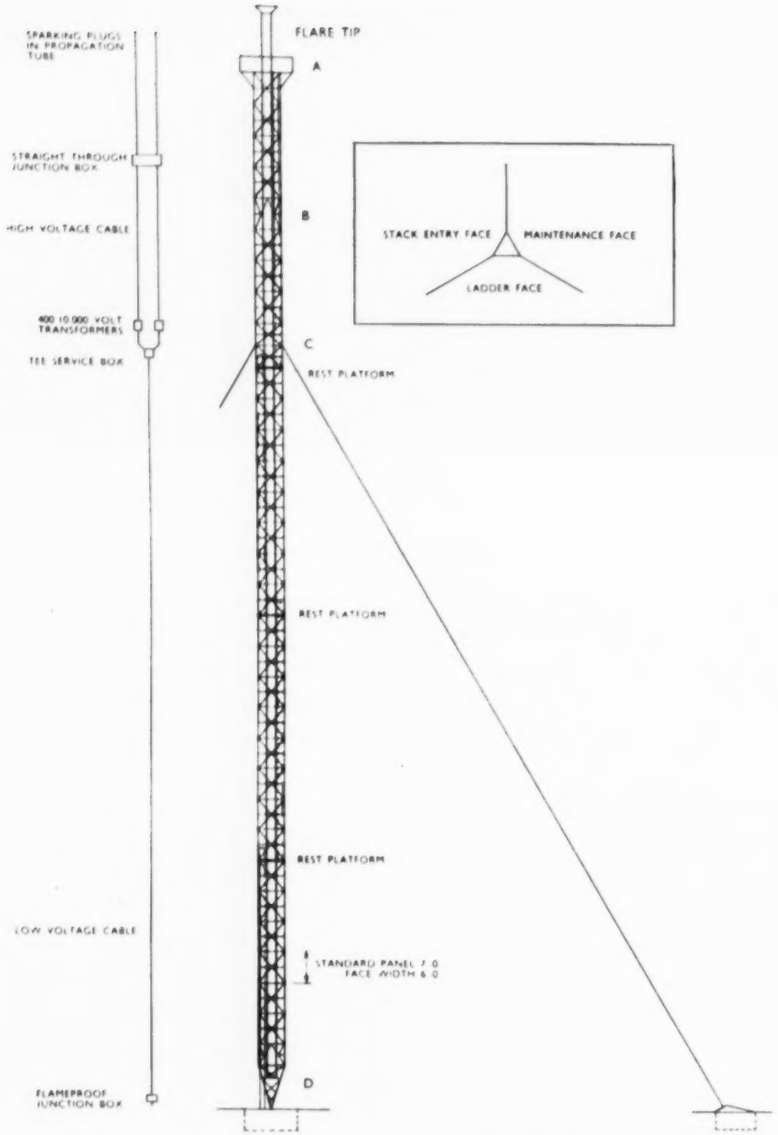
From this partial outline of the activities under way at Aden, it will be seen that the mere preparation of the site for the new development is a major engineering enterprise and one requiring a heavy investment. When the refinery is completed, it is expected that about 300 British nationals will be required in the operation of the completed project, while in addition, about 2,000 skilled and unskilled employees of other nationalities will be required, who together with their families will form the nucleus of the inhabitants of the new town that is being built.

In addition to the refinery and oil port, a township including not only living accommodation for all grades of the company's staff, but also shops, minor industries and municipal facilities, will be established in co-operation with the Aden government, which will control the development of the area and take over public utility services such as roads, lighting, water supplies and sewage disposal, it being the intention that this township, while primarily built for the personnel of the oil company, shall not be restricted to their sole occupation, but shall fit in with the general development of this section of the country of Aden.

A corner of the transport yard site.



Water boring rig at Bir Ahmed.



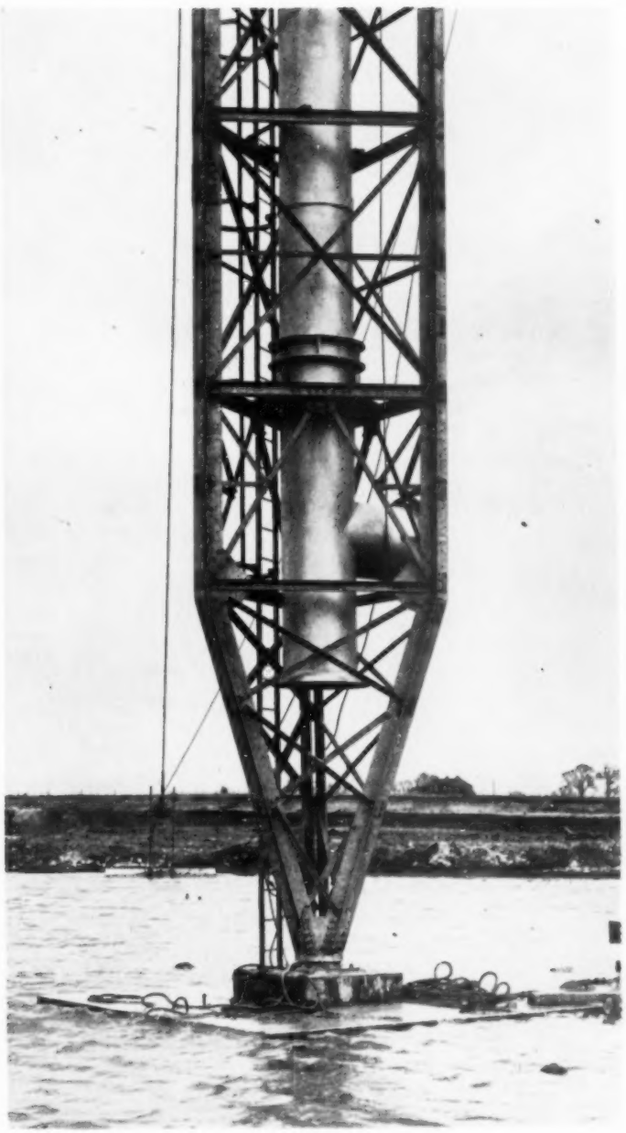
Detail of supporting mast.

Completed mast at Llandarcy is equipped with four stays.

Light weight flare stacks installed by Anglo-Iranian

AN UNUSUAL design has been employed for the five flare stacks erected at the three major oil refineries of the Anglo-Iranian Oil Co., Ltd., in the United Kingdom. Two are used at the Llandarcy refinery in Wales, one at Grangemouth in Scotland and two at the Isle of Grain in the Thames Estuary.

The 250-foot stacks, two feet in diameter, are supported by guyed steel lattice masts 235 feet high. The waste gas is ignited at the top of the stack by a constantly burning pilot flare, but an electrically-operated flame propagation unit has been installed to relight the pilot in case of failure.



Bottom section of a completed mast on the Isle of Grain, photographed during recent flood.

The 2-inch diameter steel ball being placed in position.

British Insulated Callender's Construction Co., Ltd. designed, supplied and erected the masts, and also supplied and installed the electrical equipment to Anglo-Iranian specifications.

This type of supporting mast, believed to be the first of its kind to be used in the oil industry, was chosen because it is only two thirds the steel weight of a comparable self-supporting structure, and because it would have been extremely difficult to provide reliable foundations for an unstayed tower on the marshy site involved. The masts are similar to those used by the British Broadcasting Corp. The height of the stack was governed by the flare heat.

The cross-sectional area of the stack is based on a maximum rate of flow of waste gas of 1½ million cubic feet an hour, and the maximum temperature of the flame is estimated at 1,000° F. During maximum discharge the flame might attain a length of 50 feet.

The 235-foot mast is triangular in cross section, with six foot faces, the corner members being two standard angles battened together. The total weight of the mast is 21 tons, and the bracing system is by double-warren panels which are seven feet long, with the exception of the two adjacent to the stay attachment point, these being only five feet long, which gives equal distribution in the legs of the vertical components of the stay tensions.

Any part of the mast can be reached with the aid of an external caged ladder which extends the full height, with rest platforms provided at approximately 60-foot intervals. At the head of the mast there is a working platform extending all around the stack.

Three stays are attached to the corner members of the mast at the 174-foot level, with the ground ends secured to concrete anchorages through a length adjusting device, comprising a cross-

head which can slide along two parallel screwed rods. These devices are necessary to ensure that the calculated still-air tensions are imposed on the ropes during erection and, also, to take up any inelastic stretch which may develop due to bedding down of strand wires after they have been in service. The angle of the stays is 53° with the horizontal.

At the mast base, a rocker bearing is formed between two steel plates, the lower of which is slightly convex. A 2-inch diameter steel ball recessed equally and centrally into these plates takes the horizontal shear and the whole bearing is designed to afford free angular movement of the mast.

The masts have been designed to withstand a wind velocity of 75 miles per hour. Under this load the mast head would move approximately 2½ feet from the perpendicular.

The masts were stayed only at the 174-foot level because, although it would have been more economical to use two sets of supporting guys, the poor ground conditions at both Grangemouth and the Isle of Grain were likely to cause unequal settlement of the stay anchorages which, with two sets, would set up damaging strains on the masts unless frequent adjustments were made.

The varying ground conditions at the three sites necessitated three different types of foundations. At Llandarcy the ground is firm and, although there is a general slope of 30°, conventional foundations were possible for the masts and stay anchorages. One problem which did arise, however, was caused by the orientation of one of the structures which would have placed the anchorage of one of the stays in a 30-foot depth of newly made ground. This was obviated by replacing the one stay with two others which were each attached to a face of the mast. The two stays have a horizontally included angle of 120° and they are secured to the mast through special frames to allow their lines of action to pass through the center of area of the mast section. This arrangement avoids the torsional forces which would have arisen had both stays been attached to a single plate on the relevant corner leg.

The device of attached stay-frames can be used on any guyed mast to overcome difficulties of siting stay anchor blocks due to existing obstructions, including refinery buildings, roads and pipe runs.

At Grangemouth, even piles driven to a depth of 80 feet had failed to give reasonable bearing values so that all the refinery buildings are built on reinforced concrete rafts. The mast foundation is an octagonal raft, one foot deep and 30 feet across opposite faces, with eight radial stiffening beams, 18 inches wide, projecting 2½ feet above the raft at the center, but tapering to a depth of 1½ feet at the end. The base dimensions of the stay anchorages were enlarged to compensate for the low bearing values.

Flare tip showing special alloy shields for the spark plugs on the flame propagation tube (center). Gas pipe for the propagation tube is on left and the pilot flare on the right.

As piles gave reasonable bearing values on the Isle of Grain site, the mast bases each consist of four piles, 45 feet long and 12 inches square, capped with a reinforced concrete head.

The flare stack itself is a two-foot diameter mild steel pipe, with ⅜-inch walls, made up of 25-foot sections welded together after installation. The total weight is approximately 11½ tons. During the erection of the mast the first section of the flare stack, which included an entry for the horizontal run of pipe from the process units, was placed in position and the weight taken through three adjustable distance pieces inserted under a collar specially welded to this section of pipe and resting on the supporting frame of the mast.

Before entering the vertical stack in the mast, the horizontal run enters a knock-out drum, eight feet in diameter and 16 feet long, which traps any liquid carried in suspension by the waste gases. The bottom section of stack has a removable bolted plate in the underside which can be removed for maintenance.

After the mast had been erected, the other sections of the flare stack were hauled to the top of the mast and positioned by lowering through the structure. At one end of each section a 4-inch wide ring, 25 inches in diameter, was welded to form a short sleeve with an overlap of two inches. The bottom edge of each section was lowered into the overlap of the ring at the top of the lower section and, when the complete stack had been installed, these were fillet welded to make one continuous pipe.

The stack is located centrally within the mast by horizontal frames spaced seven feet apart and contact is made between stack and frame by three two-inch

diameter rollers spaced equally around the circumference. The rollers were necessary since, after welding the sections of the pipe, the complete stack was raised four inches and the support point taken to the 205-foot level. The lifting operation was carried out by jacks at the base of the mast. The weight of the stack was finally transferred to the top support point and rested on three adjustable distance pieces inserted between a collar on the pipe and the frame of the mast. These distance pieces were eventually welded into position, at the collar and at the frame, to make a rigid fixture. During the lifting operation the lower distance pieces were adjusted to follow the stack as it was lifted in case there was any failure on the part of the jacks.

The reason for suspending the stack at the 205-foot level is to limit its increase in height due to thermal expansion to that of the 45 feet above the support point. Thermal expansion beneath this point will be reflected downwards.

Flange-bolted to the top of the stack is a two-foot section of stainless steel lined pipe which contains the flame arrester, consisting of layers of stainless steel mesh. Flange-bolted to this is the final length of stainless steel pipe, 11 feet long, which opens out at the head of a bell mouth 5 feet 8 inches across. The flare tip is heavily coated internally with an insulating refractory material. These two sections are bolted rather than welded in case they have to be dismantled for maintenance.

At Llandarcy it was found necessary to inject steam into the flare tip of one of the stacks through a four-inch pipe to minimize smoke.

The waste gases from the catalytic cracking unit and other process plants are fed into the stack and ignited by a constantly burning pilot flame in the mouth of the flare tip, fed through a one-inch standard mild steel gas pipe from the refinery's fuel gas system. The top 11-foot section of gas pipe is of stainless steel. In the event of the pilot flare's being extinguished, an electrically-operated stainless steel flame propagation tube is installed to relight it.

The propagation tube is 11 feet long and three inches in diameter, open at both ends, with the top adjacent to the pilot head. It is fed by a one-inch pipe from the fuel gas system, the top 11 feet of pipe also being stainless steel. The gas enters the propagation tube at a series of levels, and the gas/air mixture is ignited by two independent high voltage spark plugs fixed to the tube, protected by special alloy shields and energized from step-up transformers. The operation is push-button controlled from the refinery control room, and the propagation tube remains alight only while the push button is depressed, the same action energizing the spark plugs and working a solenoid-operated valve which starts the flow of gas to the propagation tube.

At the base of the mast is a two-way 660-volt flame-proof junction box with a 600-volt grade two-core VIR lead-covered steel wire armored and served and compounded cable leading to a compound-filled T service box at the guy attachment point (174-foot level). The service box is connected by short lengths of similar cable to the primary terminals of two 440/10,000-volt transformers.

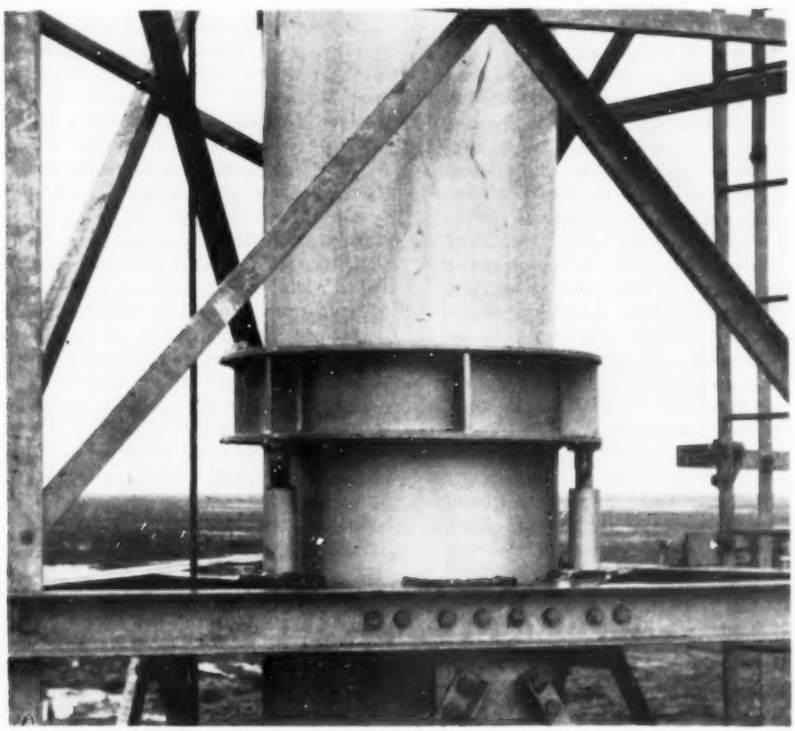
Each spark plug, of the normal aircraft type, is connected to one of the transformers by a single-core metal-sheathed mineral-insulated cable, the two plugs thus being on separate circuits. The transformer end of each cable has the metal sheath connected to the other terminal of the secondaries, while the spark plug end has the sheath bonded to the flame propagation tube by copper strip connected to clamped copper sleeves.

The cable of this high tension circuit consists of a robust solid drawn malleable copper tube with the copper conductor embedded and firmly positioned within a highly compressed magnesium oxide powder. These materials are inorganic, non-inflammable and non-ageing, and give a cable capable of withstanding considerable mechanical abuse without disturbing the relative position of the conductor.

In case the extreme heat damages the cable, a straight-through junction box has been installed mid-way on each run, between the transformer and spark plug, in an effort to reduce the amount of cable which might have to be replaced. Special terminals had to be developed for the cable as ordinary cold seal terminations would break down under the heat. These terminals were made by stripping back the metal sheath and mineral dielectric and passing the bared conductor through a corundite insulator, to which was swaged a copper-plated steel sleeve brazed at one end of the metal sheath of the cable. The conductor was brazed to the inside of a terminal stud on the corundite insulator. The corundite insulator came to within approximately $\frac{1}{8}$ inch of the magnesium oxide powder in the cable and the ensuing void was not filled.

The two transformers, which are bitumen covered and capable of intermittent operation at 200°F, ambient temperature, are installed at the 174-foot level as a compromise between the length of HV cable required to connect the spark plugs with the transformers, and the proximity of the transformers themselves to the great heat generated at the flare tip.

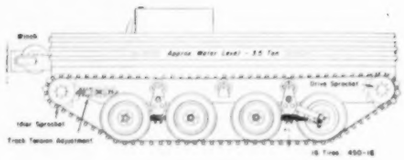
Lower flare stack support during erection showing adjustable distance pieces inserted between the frame and a collar welded to the stack pipe.



Muskeg Crawler designed especially for exploratory work in northwestern Canada.

Muskeg Crawler solves problem of exploration in northern Canada

Information contained in this article is drawn from a paper presented before the Canadian Institute of Mining and Metallurgy by G. Rempel of Imperial Oil Ltd.



IN NORTHWESTERN Canada, embracing parts of northern Alberta, northeastern British Columbia and a larger section of the Northwest Territories, with its northern portion lying athwart the Arctic Circle, is an area of some 400 square miles that is about as difficult of penetration as any portion of the earth's surface. It is known to Canadians as muskeg, a term applied to a marshy district of soggy mud, lowgrowing bush and meandering streams, incapable of penetration except during the winter when, with temperatures of 50 degrees or more below zero, the whole mass is frozen solidly.

Because of its forbidding character, the region remained of interest only to a few hardy trappers down to the time when discoveries of oil in Alberta suggested that petroleum in commercial quantity might also be found beneath this muskeg. Actually, an oil field at Norman Wells, only a short distance below the Arctic Circle, has been in production for a number of years. Obstacles to exploration by ordinary means were the shortness of the frozen period, some four and a half months, the inability to build roads and the extremely low temperatures of the winter season.

First attempts at geophysical surveys were made through the use of horses as a means of transportation. All equipment used had to be portable and a full seismic crew was sent in mounted on 12 to 14 horses and carrying the instruments needed as well as food and shelter for the group. The limitation of operations to only about a third of the year made the work slow, costly and unsatisfactory. Besides, there were many portions of the area that remained inaccessible. What was needed was a form of conveyance that would enable activity to continue throughout the year and under severe climatic conditions.

Shaded portion shows muskeg area under discussion.

Faced by this problem, Imperial Oil Co. set about devising something to meet the situation. Members of the company's staff began experimenting with a variety of military and commercial type vehicles in use in the far north.

Their tests revealed that the commercial and military vehicles under study were suitable for the purpose for which they were designed, but they did not fully answer the needs of crews prospecting in the muskeg. What they wanted was a vehicle that would "meet the fundamental requirements of low ground pressures, mechanical simplicity, power, speed and manoeuverability, ruggedness and safety of operation".

Guided by these requirements, the investigators took all the good features of equipment in use in northern Canada and combined them in an experimental vehicle using an all hydraulic drive with steering accomplished by differential power control. This hydraulic system was the most radical departure from the design of conventional or special equipment used in the north. In place of the usual mechanical drive, the unit diverted the engine power into two separate hydraulic pump and motor systems. This means of power transmission enabled each track to be driven independently of the other, with full range of power both forward and reverse in each track. The resulting combination was the vehicle to which the name "Muskeg Crawler" has been given.

The drive shaft of the Muskeg Crawler engine is coupled by high speed chains and sprockets to two hydraulic pumps. Each hydraulic motor powers one of the rear track drive sprockets through a modified Ford one-ton transmission and differential. This means of power transmission makes the vehicle performance almost identical in forward or reverse.

Control valves, one in each of the separate fluid circuits, independently control the power and direction of the respective tracks. In addition to the control valves, each separate fluid circuit is provided with a relief valve which automatically regulates the maximum operating pressure of 2,000 pounds per square inch. This pressure gives a theoretical maximum fluid motor output of 97.5 foot pounds of torque or 31.5 hp at 1,700 rpm.

The power source of the Muskeg Crawler is a "337" V-8 Lincoln industrial engine, which has more than enough power to drive the hydraulic components at maximum allowable pressures. The maximum torque developed at each final drive sprocket is in the neighborhood of 500 foot pounds in high gear or over 2,000 foot pounds in low gear. The top speed of the unit is about 16 miles per hour.

The front idler sprockets are spring loaded and the track tension is regulated by increasing or decreasing this spring action. Each track runs on four sets of dual 4.50 x 16 tires and is returned along three small idler wheels. The two front and two rear dual wheel assemblies of each track are independently suspended from the chassis. This suspension consists of a trunnion system which allows vertical movement of individual duals. For further trunnion and spring action, the assembly is suspended from the body by a shaft mounted bracket. This allows each pair of wheel assemblies to rotate about the shaft. The track suspensions are laterally rigid. Each track is 24 inches in width and consists of three strips of steel cored rubber belting with adjacent strips being connected by metal crossovers or growsers. Power is applied to the track through the growsers by means of the rear sprocket.

The center to center distance between tracks is 60 inches. Since each track is 24 inches wide and has 96 inches of its length on the ground, the total ground contact area is 5,000 square inches. The total gross weight of the vehicle is approximately 9,500 pounds, which results in a ground pressure in the order of 1.9 pounds per square inch. When not floating, this pressure will allow the vehicle to cross terrain considerably softer than that required to support a man walking.

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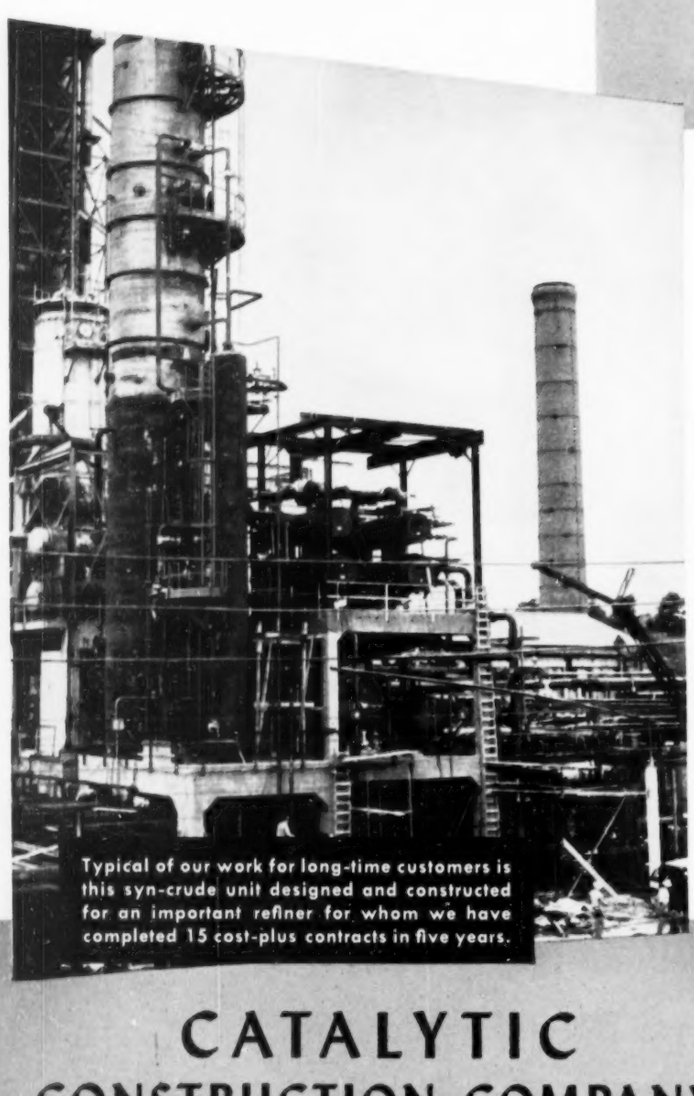

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Delay in official action on gas slows Canadian exploration

By J. L. Irwin

ESTIMATES of Canada's oil production during the first half of 1953, based on the best information available at present, give a total of 34,722,607 barrels. By provinces, this preliminary figure is made up as follows: New Brunswick, 8,746 barrels; Ontario, 96,019 barrels; Manitoba, 203,522 barrels; Saskatchewan, 1,264,282 barrels; Alberta, 32,992,101 barrels; Northwest Territories, 157,937 barrels.

The estimated total for the half year shows an increase of approximately nine million barrels over the corresponding 1952 period. Substantial increases appear this year for Alberta, Saskatchewan and Manitoba.

Despite this increase and the additional fact that before the current year is out oil pipe lines will have connected western Canada with the Atlantic and Pacific seaboards, following which market demands for oil will soon be doubled, there is a current slackening of exploration activities.

The reason for this is mainly the vexed question which surrounds gas export. It is a question upon which no decisive action has been taken up to the present either by the Canadian government or that of the United States.

With the evidence of increased output, it is obvious that no slump in the industry's production development has taken place. On the other hand, support of the stock market has been withdrawn during this long period of indecision.

If no additional markets to absorb western Canada's surplus gas have materialized by the time the oil pipe lines have reached Vancouver and Sarnia, Ontario, it is estimated from the highest sources that gas wastage at the flares will increase from last year's 17 billion cubic feet to around 50 billion or more per year.

Other factors of a disturbing nature enter into this situation. Westcoast Transmission Company's application to construct a gas line from the Peace River area to Vancouver and the northwestern states of the United States has been approved by the federal government of Canada and by that of Alberta. Approval is now being awaited from the Federal Power Commission at Washington. If it is not given, and from one quarter we are told that it has no better than an even chance, the consequences will be very serious.

An enormous amount of money has been spent to prove up the gas reserves for this project. They are more than adequate now to provide a 20-year supply for the prospective market. The possibility of refusal lies in the application of a United States firm to transmit gas from New Mexico to the same market. This will be a line of greater distance. Such being the case, presumably it will be more costly, and therefore demand a higher consumers' price at the end of the line.

Applications for a gas line from Alberta to Ontario and Quebec, according to the federal government of Canada, must go by an all Canadian route. This would mean north of the Great Lakes through a barren wilderness devoid of settlements. Without adequate markets en route, the consumers' price at the end of the line will obviously be higher than if the route passed through the United States south of the Great Lakes with markets all the way.

The Interprovincial oil pipe line will take the southern route, re-entering Canada at Sarnia, Ontario. The gas and oil pipe lines could parallel each other, returning to Canada at the same point. If considered necessary at the present time, Canadian gas could pass through the states in bond, the line being ready for markets below the border at a later date when Canadian reserves increase. With this southern route, use of the Dawn field in southwestern Ontario for summer gas storage would improve still further the economics of this venture.

Some 300 commercial gas wells are standing capped in Alberta, some for a very long time, awaiting a market. They have cost the producers many millions of dollars. The gas reserves of western Canada are now known to be extensive. The latest estimate made at the gas export hearings in Calgary by Trans-Canada Pipe Lines Ltd., for proven, probable and possible reserves, total 18.8 trillion cubic feet, with 13.4 trillion available for sale. The proposed line to Montreal to cover a 20-year supply will require five trillion feet.

Still another obstacle to oil development, from which relief can come only from additional gas markets provided by export, exists in adverse gas/oil ratios which present themselves from time to time. With wastage of gas prohibited at wellheads, only a limited oil production is permissible. In some cases, oil production has been prohibited altogether.

While 1953 is Canada's greatest oil year, exploratory work has been reduced and geophysical parties in the field are less in number. It is an amazing paradox. For many months support for oil activity in the stock market has been noticeably withdrawn. International politics and a restless world situation have of course played a part in this. The principal reason, however, for lack of support is a cloud of uncertainty regarding gas export which overhangs the industry.

It is tragic that this situation should prevail at this important stage of western Canada's immense expansion in oil development. A solution to the problem no doubt will be found, but it is unfortunate that it should come into existence.

Within the next year or two demands for oil for the new great national pipe lines will be doubled, quite possibly more than doubled. To meet this, production will have to increase enormously. Exploratory work should be now at its greatest peak, but it has fallen off. In Alberta, we were recently told, drilling rigs, at the time of writing, totaled 152 compared with 209 a year ago, a decline of 27 percent. Seismic parties have dropped in number from 129 to 114, a decrease of 12 percent. Two months ago there were 142 active parties. Daily expenditures in financing geophysical crews have dropped by $50,000 a day, which has created a loss of 1,500 jobs.

Some of the major oil companies' annual reports this year have emphasized the heavy burden of excessive taxation from all classes of governments, federal, provincial and municipal. So much is taken from net earnings that funds from what remains for continued development expenditures are much reduced, creating the necessity for continuous increased capital. Excessive taxation in this great expanding period presents another complex question.

In Alberta, oil and gas are generally found together. To obtain full economic benefits from these discoveries they should be developed together, but without adequate markets for surplus gas this is not

possible. Measured in terms of dollars, gas development in the United States in recent years has risen from millions to hundreds of millions, and has now reached billions. Had Alberta started such development ten years ago, or at least following the Leduc discovery of 6½ years ago, the Province might also have been approaching this category by now. Atomic energy for industrial use is a subject which appears to be taking definite shape. In a few short years it may materialize.

How much time still remains in which to make decisions regarding gas export, construct main lines and gathering lines, and at least transmit this surplus gas to long awaiting markets, is an open question. It is a national project, promising benefits to a vast number of people, which should have been started years ago.

These are some of the problems facing western Canada at the present time, when oil companies should be freed from all obstacles standing in the way of considerably increased exploratory work.

Last, but by no means least, there is urgent need for a top level conference between Canada and the United States on the subject of gas export, as stated by C. O. Nickle, M. P. for West Calgary, in a recent published address. It would, as he says, end the "nationalistic talk and mutual distrust building up on both sides of the border."

Perhaps this is the most important point of all. A closer co-operation is needed just now, together with a clearer understanding of vital questions dealing with national and international economics.

Both Canada and the United States have been blessed by a beneficent providence with much of the world's wealth in natural resources. There is enough, and more than enough, for both of these two great countries. Surely an adjustment covering the disposal of these resources should be made to the general satisfaction of each.

Brazilian Senate enacts bill tightening national monopoly

By R. G. Walker

THE new petroleum law of Brazil, as approved by the Senate on June 9, establishes a state monopoly of prospecting for and development of petroleum and gas, of their transportation by ship or pipe line and of the refining of natural or imported oil. The monopoly is to be operated through the National Petroleum Council as the policy and supervisory agency and through the stock company Petroleo Brasileiro S. A. and its subsidiaries as the executive agency.

The National Petroleum Council, operating under direct authority of the President, is to supervise measures concerning the supply of petroleum and its products, whether by production, importation or refining. Petroleo Brasileiro S. A. is to have as its objective exploration, production, refining, trade and transportation of petroleum. The company is to have an initial capital of four billion cruzeiros divided into twenty million shares of 200 cruzeiros each. The Union, representing the government, is to underwrite the initial issue of stock and also is to hold 51 percent of shares subsequently issued. The act specifies in detail the regulations governing the financial operations of the company and provides that its stockholders must be limited to government agencies, the Bank of Brazil and Brazilian citizens.

The company is obligated to pay to the states or territories in which petroleum deposits are found five percent of the value of the oil extracted and the states in turn must turn over to the municipalities in which production is located 20 percent of whatever amounts they receive.

The act specifies that Petrobras may employ military or civil servants of the government or of semi-autonomous agencies or mixed companies in managerial or technical positions. The company is also authorized to train men for its personnel or for qualified labor positions. It can operate directly or through subsidiaries organized with approval of the National Petroleum Council, but in filling managerial positions, preference must be given to native born Brazilians in whatever concerns the activities of the petroleum industry.

Refineries now in operation in the country are excluded from the monopoly established by the law. Authorizations to establish refineries issued up to June 1952 shall not be prejudiced, except for plants that are not functioning within two years from the date of adoption of the law. Petrobras may participate as a stockholder in any of these companies for the purpose of bringing them into subsidiaries.

Mixed companies referred to in provisions of the act, existing on the date when it becomes effective, are released from the proof of nationality.

Included in the act are stipulations as to the division of proceeds from the tax on liquid fuel and lubricants which are made proportional to the area of the political subdivision, its population and its production of crude oil, shale oil or condensates.

For Article 41 of the bill as originally drawn, a substitute was adopted providing that by decree of the President, after consultation with the National Petroleum Council, Petrobras may associate itself with entities whose purpose is petroleum development outside national territory, providing Brazil's participation or that of Brazilian entities is covered by treaty or covenant in each case.

As appears from the provisions of the act, it is designed to effectuate complete nationalization of the petroleum industry and to establish a monopoly in all its operations from prospecting to distribution. Discontent with the shape the law has taken, however, is general. The extreme advocates of nationalism criticize it as too liberal and they predict that the Chamber of Deputies will revoke some of the Senate's numerous amendments. Those who favor participation in the industry by outside capital assert that the chance of interesting foreign investment has been excluded by the terms of the bill. They particularly condemn the exclusion of three words, "and other undertakings," from subamendment No. 56. This section originally read: "The government—may contract—work of prospecting, drilling, extracting and other undertakings to be paid—." This could have been interpreted to permit the employment of non-Brazilian organizations for exploration, drilling and other industry operations as has been done in the past.

One Senator told the press that if the Chamber of Deputies approves the bill as passed by the Senate, he will move for its annulment in the next legislative session. The President of the National Federation of Commerce has expressed the opinion that if the Senate action is allowed to stand it will retard solution of Brazil's oil problem at least ten years.

PAULSBORO, NEW JERSEY

Fluor played a prominent role in the expansion program now being completed at Socony-Vacuum's Paulsboro refinery, one of the largest on the East Coast. Fluor's "turn-key contract" called for the engineering and erection of the 15,000 B/D Thermofor Cat-Cracker – similar to the one Fluor built for Socony at Augusta, Kansas, two years ago – plus the feed preparation system, fractionation units, gasoline plant, piping and many of the offsite facilities – all on schedule and within the budget. Fluor's ability to design, engineer and build complete plants and facilities for the petroleum, gas, chemical, power and heavy industries has been ably demonstrated on many previous occasions.

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INTERNATIONAL NEWS AND NOTES

U.S. Declines Economic Aid to Iran

In an exchange of communications between Dr. M. Mossadeq, premier of Iran, and President Eisenhower, made public at the White House on July 9, the President made it plain that the American government would not be willing to extend further economic aid to Iran until steps were taken to settle the oil dispute between that country and Great Britain. If this could be adjusted on a fair basis, the President wrote, it would strengthen the international credit standing of Iran and would lead to solution of some of the financial and economic problems facing the country.

Replying to the request of Dr. Mossadeq for increased American financial aid, the President wrote:

"The failure of Iran and of the United Kingdom to reach an agreement with regard to compensation has handicapped the government of the United States in its efforts to help Iran. There is a strong feeling in the United States, even among American citizens most sympathetic to Iran and friendly to the Iranian people, that it would not be fair to the American taxpayers for the United States government to extend any considerable amount of economic aid to Iran so long as Iran could have access to funds derived from the sale of its oil and oil products if a reasonable agreement were reached with regard to compensation whereby the large-scale marketing of Iranian oil would be resumed. Similarly, many American citizens would be deeply opposed to the purchase by the United States Government of Iranian oil in the absence of an oil settlement."

Mr. Eisenhower added that sentiment in the United States was that payment to the dispossessed oil company merely of compensation for its physical assets would not be a reasonable settlement. Thus the President took a position in full agreement with that maintained by the British government.

German Consumption Increase

Consumption of petroleum products in the Federal Republic of Germany (West Germany) during the first quarter of 1953 is estimated at about 1.41 million tons, a gain of nearly 13 percent over the corresponding period of 1952. Consumption of gasoline at 845,000 tons was up 12 percent; use of diesel oil rose 18 percent to 438,000 tons; while fuel oil at 280,000 tons made only a small gain, as Germany still relies mainly on coal for fuel. Consumption of lubricants increased 86,500 tons, or nine percent.

At the annual meeting in Hamburg of the Mineraloelwirtschaftverband it was pointed out that heavy taxation of the oil industry amounting to a billion Reichsmarks yearly was the main reason why Germany's oil consumption, despite her general economic recovery, is still much below the level of neighboring European countries.

Gas Turbines For Venezuela

Mene Grande Oil Co. has ordered three 5,000-kilowatt gas turbine generating units and auxiliary apparatus from the Westinghouse Electric International Co. The equipment will supply electric power to its oil field operations in eastern Venezuela, and is scheduled for delivery in 1954.

The new units will form a central station to supply electrical energy over 69-kilovolt transmission lines to oil and gas pumping stations throughout the area. They will replace present scattered gas-engine driven power plants.

Each new unit will consist essentially of three elements: an axial-flow air compressor that takes in and compresses 400,000 pounds of air per hour; a combustion system that mixes and ignites fuel and compressed air; and a five-stage gas turbine.

J. H. Loudon *H. Bloemgarten*

Royal Dutch/Shell Officials Honored

J. H. Loudon and H. Bloemgarten, managing directors of the Royal Dutch/Shell group of companies, were recipients of honors from Queen Juliana of The Netherlands on April 30. Both were appointed Knights in the Order of The Netherlands Lion in recognition of their constructive work in behalf of the Dutch economy.

To Build Refinery In Puerto Rico

Caribbean Refining Co. has entered into a contract for construction at San Juan of its first refinery to be built in Puerto Rico, according to an announcement by Edwin Singer, president of the company. The plant will have a daily capacity of 10,000 barrels and will involve the investment of over $10,000,000.

Construction of the refinery will be directed by the Fluor Corporation of Los Angeles, and will operate under licenses from Universal Oil Products Co. It will be equipped for fluid catalytic cracking and will have crude and vacuum polymerization units and a gas recovery installation. It will produce gasoline, distillates, fuel oil and liquefied petroleum gases. Plans for the refinery have been drawn and it is expected that it will be completed early in 1955.

Simultaneously with the release of information in New York of the refinery project, it was announced in San Juan that the Puerto Rico Water Resources Authority has awarded a contract to the refining company for all its fuel oil requirements for a period of ten years.

Morrisey Returns to U. S.

A. W. Morrisey, who has been with Kellogg International Corporation in London for the past two years as director of estimating, a department which he organized, has returned to New York to resume his duties with the M. W. Kellogg Company, the parent organization.

Foxboro Establishes Firm in Mexico

Organization of a Mexican affiliate, Garficas e Instrumentos, S.A., has been announced by the Foxboro Company of Foxboro, Mass. The new firm, located in Mexico City, has been incorporated for the future manufacture and assembly of instruments and instrument supplies. The new concern has obtained factory facilities adjacent to Schultz y Cia., Foxboro's sales representatives in Mexico. The Mexican company is the third to join the list of Foxboro's international affiliates. Companies in London and Montreal have for more than 20 years manufactured virtually the entire line of Foxboro.

Barge Train Serves African Markets

Carrying petroleum products in bulk from Lagos, Nigeria, over 1,200 miles of West African waterways to Garoua, in the French Cameroons, is a recently instituted "barge-train" service of the Oil Storage Company of Apapa, which is jointly owned by the Shell and Socony-Vacuum Oil companies.

The "barge train" consists of eight especially designed 200-ton barges and the "Adams," the most powerful tug plying the Rivers Niger and Benue. The tug pushes the barges in pairs ahead of her through winding creeks to oil storage depots which have been constructed along the Niger and Benue rivers. These are located at Lokoja, where the Niger and the Benue unite, and at Sapele and Onitsha.

Formerly petroleum was supplied to these places only in drums and tins, but with the rising demand for petroleum products, the method proved inadequate to satisfy the increasing consumption.

Numerous problems of design and navigation had to be settled before the barge train was put into operation. One of the chief obstacles was the Benue River, unnavigable as far as Garoua except during the rainy season, which lasts for only two and a half months during the year. To overcome this obstacle, a transit depot was built at Lokoja, where, during the dry months the "barge-train" unloads to build up supplies for shuttling to the Garoua depot during the brief rainy period.

On the 1,200-mile journey, the "barge train" passes through some 250 miles of lagoons and creeks before reaching the main Niger River at Burutu, whence it follows the route of the Niger as far as Lokoja, where the Niger and Benue rivers meet.

This waterborne "barge-train" will carry over fifteen thousand tons of petroleum products to Garoua every year and is an important contribution to the economic progress in this part of West Africa.

The "barge-train" on the Niger River with United Africa Co. lighters in the foreground.

New Giant for Anglo-Iranian

A PROUD REPRESENTATIVE of the British Merchant Navy at the recent Coronation Fleet Review was the giant new tanker s.s. *British Sailor*. She is the first of thirteen 32,000-tonners on order for the British Tanker Company, shipping organisation of Anglo-Iranian

The British Tanker Company now owns some hundred and fifty tankers totalling nearly two million deadweight tons and has a further twenty-seven tankers on order or under construction.

These ships will feed refineries in seven countries and marine bunkering stations in four continents. Anglo-Iranian, with its subsidiary and associated concerns, is one of the major and most progressive units in the world petroleum industry.

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BRITISH OIL NEWS

By E. Lawson Lomax

Coronation ceremonies in London provided the occasion for June visits of many Middle East potentates or their representatives from oil producing territories, as well as other visitors interested in the petroleum industry.

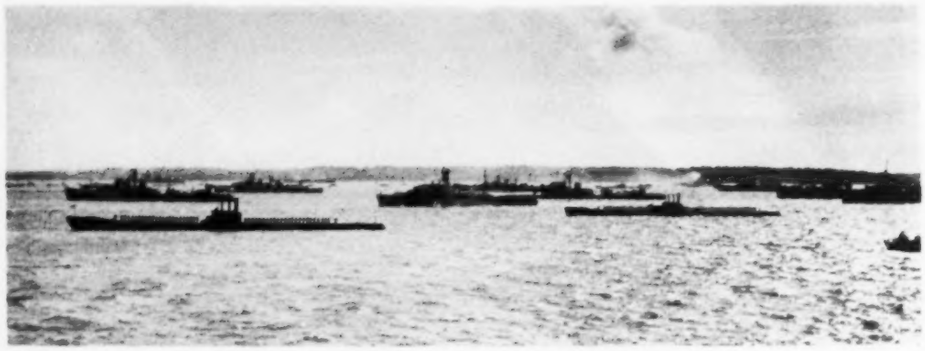
Among those who attracted special interest and attention were Shaikh Abdulla al-Salein al-Subah, ruler of Kuwait, H. H. Shaikh Sir Sulam bin Hamad Al Khafifah K.C.M.C., K.C.I.E., ruler of Bahrain, H. H. The Sultan of Lahej, whose territory adjoins the site of the new refinery being built at Aden, and six of the Aden Protectorate Shaikhs.

Visitors from Australia interested in the new refinery at Kwinana were the Premier of Western Australia, the Hon A. R. C. Hawke, the Under-Treasurer of Western Australia, A. J. Reid, R. H. Doig, Secretary to the Premier's Department, The Rt. Hon. Harold Holt, Australian Minister of Emigration, Labor and National Service, Senator Neil O'Sullivan, Federal Minister for Trades and Customs, and Sir Ross McLarty, leader of the opposition in the West Australian Parliament.

Visitors from Burmah included U. Win, Minister for National Planning in the Burmese government and U. Khin Maung Pyn, Chief Secretary to the government.

The importance of the petroleum industry to the British Navy was shown by the inclusion in the Naval Review at Spithead on June 15 of three tankers representing major tanker companies, these being the "Villetia" of the Shell Group, the "British Sailor" of the British Tanker Co., associate of the Anglo-Iranian Oil Co., this tanker being the largest under the British flag, and the brand new tanker, "Caltex Bahrain" of Overseas Tankships (U.K.), Ltd. The first two of these tankers had been withdrawn from service to participate in the review, but the third was fresh from her trial runs and went into service immediately after the review.

The accompanying photograph shows H.M.S. "Surprise" with the Queen and Duke of Edinburgh on board passing between the lines of the fleet, with "Caltex Bahrain" in the center background.



View of the Coronation Naval Review at Spithead, June 1953, showing the Queen's yacht, H. M. S. Surprise, center, and the "Caltex" Bahrain at left center.

Personnel

N. F. Myers, a managing director of Esso Petroleum Co, Ltd., has resigned his position on the board of directors and has returned to the United States to take an appointment as deputy co-ordinator of refining for Standard Oil Company (New Jersey).

Mr. Myers came to England in 1949 to assist in directing the construction of the Esso refinery at Fawley, and to plan and supervise the training of the additional 1500 technicians and operatives necessary for the new plant, and also to steer the refinery through the critical early stages of its operation. He joined the Standard Oil Development Co. in 1941, and was appointed assistant chief engineer in 1946. During the war he spent some time in Britain on important work in connection with the allied war effort and in 1946 received from President Truman the Medal of Merit for his services with the National Defense Research Committee.

Honeywell-Brown Ltd. announces that owing to increasing demand for their products, they have built a new factory on the Newhouse Industrial Estate, at Motherwell, Lanarkshire, Scotland and are removing to it. The new factory is two and a half times as large as the old one and requires about twice the number of employees. The company also announces the appointment to its board of V. D. MacLachlan and L. R. Price. Additionally Mr. MacLachlan has been appointed general manager.

Peabody Ltd. report that George W. Nokes has been appointed general manager of the company which is affiliated with Peabody Engineering Corporation, New York. Mr. Nokes, who is an associate member of the Institute of Petroleum and an associate of the Institute of Fuel, has had 25 years' experience in the petroleum refining and combustion field and operated the first Cross cracking units in England when he was with Medway Oil and Storage Co., Isle of Grain, Kent, He joined Peabody Ltd. in 1946.

A. Patrickson has been appointed works manager of Kent oil refinery of Anglo-Iranian Oil Co., Ltd. He was born at Newcastle-on-Tyne, is 49 years old and was educated at Swansea Grammar School. He joined the staff of the Anglo-Iranian's Llandarcy refinery in 1922, and seven years later was transferred to Abadan where he became general superintendent in 1950. He has been process superintendent at Kent since January 1952.

A. W. G. Trantor has been appointed general manager of Anglo-Iranian's Aden refinery. He was previously works manager at Kent. Mr. Trantor is 45 years of age, a native of Aberdeen, and formerly chief engineer at Abadan. He was educated at Robert Gordon's College, Aberdeen, and at Aberdeen University and served his engineering apprenticeship with a Scottish firm before joining Anglo-Iranian in 1935.

Exploration In Britain and Sicily

D'Arcy Exploration Company's search for oil in Britain is being continued with the start of a new well spudded in at Screveton, south of Newark (Notts.) at the end of May. This well is planned to go to a depth of about 3,500 feet.

In Sicily, following geological, gravity and seismic surveys, the D'Arcy Exploration Company has decided to drill a test in the Vittoria concession area. The drilling will be done by contractors with a rig capable of reaching a depth of 8,000 to 10,000 feet.

Since June 1951, when the company was granted permits to search for and produce oil around Ravanura, Vittoria and Priolo in southern and eastern Sicily, extensive exploration has been carried out. Long and costly investigations were necessary before the decision to drill was taken.

To Show Gas Turbine

A further step in the development of the gas turbine is the unit to be displayed by Ruston & Hornsby Ltd. of Lincoln at the forthcoming Engineering and Marine Exhibition which is to be held at Olympia, London, from September 3 to 17.

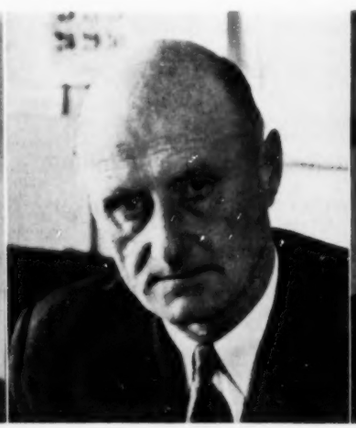
This gas turbine unit of 1000 kw output will supply power to the Olympia substation at 6,600 v. which will be transformed to 230 v. and 400 v. for lighting and power is to run at full load for 10 hours per day during the 13 days of the exhibition.

Mud Geysers Cause Seria Shutdown

Seria Oilfield (British North Borneo) was closed down for safety reasons in May, following the eruption of two "geysers" of gas and mud. The trouble was caused by a test well which penetrated an area of high gas pressure at a depth of about 7,000 feet. The gas entered lower pressure sands at a lesser depth in the borehole and then escaped along a geological fault to the surface, with the resultant formation of the two geysers. The well has now been repaired, the geysers consequently dying and conditions brought back to normal.

N. F. Myers

G. W. Nokes



A. Patrickson

A. W. G. Trantor

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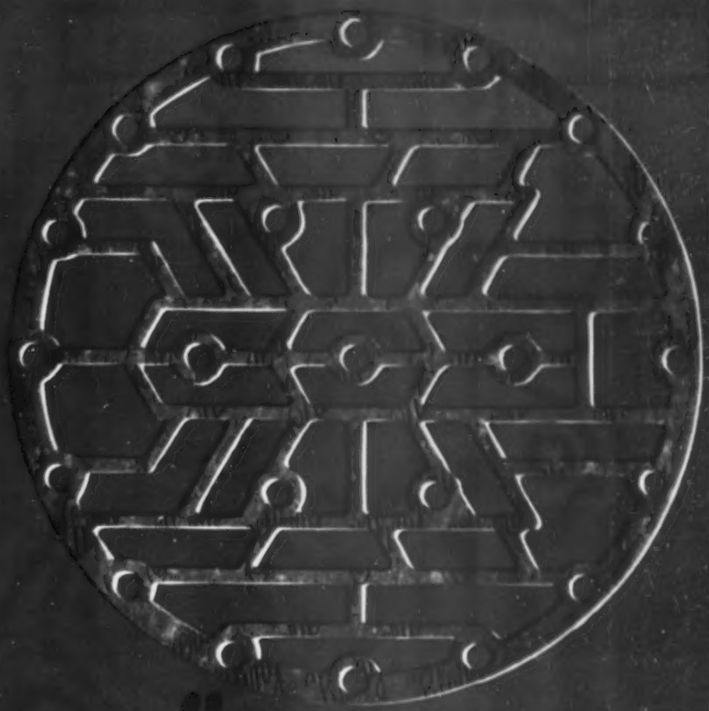

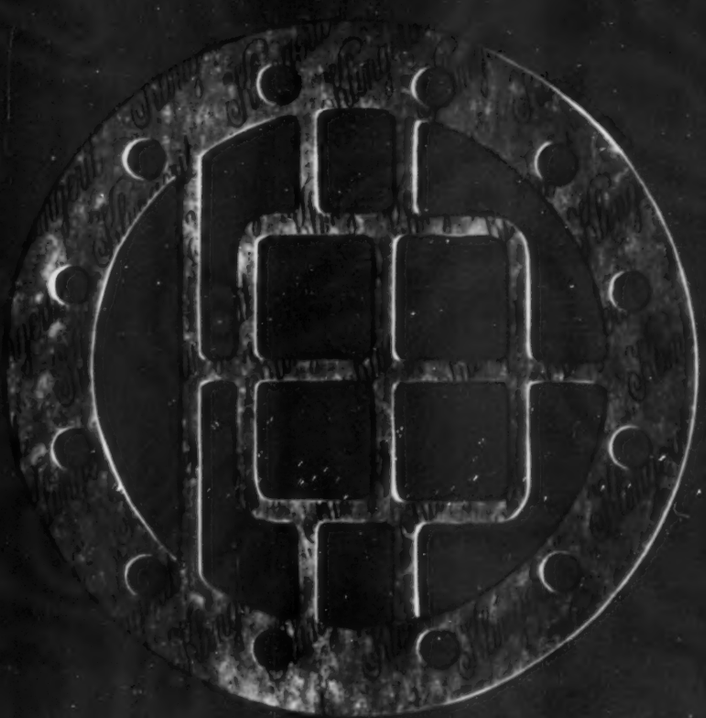

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OIL COMPANY STAFF CHANGES

P. C. Humphrey

PHILIP C. HUMPHREY has joined the staff of the Oil Industry Information Committee of the American Petroleum Institute as deputy director to assist executive director H. B. Miller. Mr. Humphrey had been manager of public relations for the past 11 years of The Texas Company. He has been identified with the Oil Industry Information Committee program since its inception in 1947, and has served three terms as a vice chairman of the national group.

As a member of the national OIIC, Mr. Humphrey has helped in the guidance of the program through the years. In addition, he also served as chairman of the film subcommittee which directed production of such motion pictures as "Crossroads, U.S.A.," "Man on the Land," "24 Hours of Progress," and "The Last 10 Feet." Three of these motion pictures won citations from Freedoms Foundation, Inc.

J. PORTER LANGFITT, senior vice president of The Pure Oil Company, relinquished his responsibilities as supervisor of Pure Oil's refining operations on July 1. He will continue to direct the activities of Pure Oil's research and development laboratories, the patent and engineering departments, and will assume general administrative responsibilities on a company-wide basis.

A new post, general manager of the refinery division, has been created, and it will be filled by P. N. Gammelgard, who has been refinery operations manager for the past four years. Mr. Langfitt and Mr. Gammelgard will continue to have their offices in Pure Oil headquarters in Chicago.

Mr. Langfitt came to Pure Oil's refining division directly after he was graduated from Lehigh University in 1925. Starting as a refinery laborer, he filled various operation jobs, and in 1937 was promoted to assistant to the vice president in charge of refining operations. In April 1947 he became vice president for refining.

Mr. Gammelgard joined Pure in 1934 as a clerk in the mechanical department of Pure Oil's Toledo, Ohio, refinery. In 1949 he became operations manager of the refinery department. During World War II he served as commanding officer of destroyers in the Atlantic, Mediterranean, and Pacific.

WILLIAM E. CONROY, former general purchasing agent for the Wilshire Oil Co. of Los Angeles, has been appointed West Coast manager of the National Aluminate Corporation's catalyst division. He will supervise Nalcat's West Coast sales activities at the division's new multi-million dollar catalyst plant, now under construction in South Gate, California.

MARCEL A. BAUR, district manager in Cleveland the past seven years for Socony-Vacuum Oil Company, Inc., sailed from New York July 7 for Dakar, French West Africa, where, after a short period of orientation, he will become general manager of the Societe des Petroles Socony-Vacuum de l'Afrique Occidentale Francaise. This company distributes in the seven consolidated colonies of French West Africa and in French Togoland and Liberia, and refuels aircraft and deep-sea vessels.

Mr. Baur joined Socony-Vacuum in 1926 in Paris after passing his baccalaureates in science, languages, and philosophy at the Sorbonne. He had gone to France after receiving a bachelor's degree in petroleum engineering from the University of Pittsburgh.

C. H. DODSON, manager of the Chicago sales division of The Texas Co. since 1950, has been named assistant to the executive vice president of the company, effective June 22, R. F. Baker, Texaco executive vice president, has announced. Ben Halsell, manager of the Boston sales division, will succeed Mr. Dodson in Chicago. Mr. Dodson will transfer to New York.

J. A. Horner

J. A. HORNER has been appointed secretary of Shell Oil Company to succeed F. W. Woods. Mr. Horner formerly was administrative assistant to the president and assistant secretary. He joined Shell as an attorney at Tulsa in 1936 and served later at Centralia, Ill., and New York.

BERTRAM A. WARREN, who has been associated with the company for more than 30 years in the purchasing department, has been appointed assistant general purchasing agent of Esso Standard Oil Co. Mr. Warren, a buyer for the company since 1934, has also served with the PAW both as a consultant and as a materials analyst. As a buyer, he specialized in the procurement of oil country steel tubular goods, oil well drilling and production equipment, welding supplies and non-ferrous metals.

RALPH C. FARLEY, formerly Tulsa division superintendent of The Ohio Oil Co., has been appointed manager of production of the Tide Water Group operations in Saskatchewan, Canada, in which Ohio Oil has a substantial interest. Mr. Farley is in charge of drilling, producing, and petroleum engineering operations. H. M. Kirk is general manager of the project. H. N. Lewis, formerly Ohio Oil's District Superintendent at Chickasha, Oklahoma, succeeds Mr. Farley as Tulsa division superintendent.

HAROLD F. MOSES, vice president of The Carter Oil Co., has been appointed deputy manager of exploration and deputy chief geologist of Standard Oil Company effective September 1. Mr. Moses has spent 30 years in geological work in Venezuela, Peru, Canada, Colombia, Panama, Mexico and the United States, and served a year as special consultant to the Turkish government on oil and geological matters.

Joining Carter in 1934, he became manager of the exploration department in 1941, was elected a director the following year, and since 1944 has been vice president in charge of exploration and research. At the same time Carter announced in Tulsa that Nelson Y. Ruth, manager of exploration, has been elected a director of that company.

CLAUDE E. LEACH has been appointed manager of the geological department, mid-continent division, of Tide Water Associated Oil Co. He will make his headquarters in Houston, Texas, and be responsible for all geological work in Tide Water's mid-continent division. He is a member of the exploratory committee which consists also of Noel W. Boston, chairman; Tom G. Kelliher, manager land department; and Ed. S. Sherar, manager geophysical department.

PERRY A. GILL, Midland, Texas, has been named purchasing agent for Sunray Oil Corp. He was formerly North and West Texas district production superintendent. Mr. Gill joined Sunray in 1946 as district engineer. He will set up a centralized purchasing department to handle all phases of the company's equipment and supply purchasing, including a correlation of buying for the production, manufacturing and pipe line departments.

RALPH O. RHOADES has been placed in charge of exploration and production by Gulf Oil Company, succeeding Dr. K. C. Heald, retired. Mr. Rhoades has been a member of the Gulf Organization for 27 years and has seen service in South America, Europe, Kuwait and Netherlands India. Since 1948 he has been chief staff geologist and since 1951 a vice president of the company.

THOMAS P. SIMPSON has been named assistant director of manufacturing of the General Petroleum Corp. effective August 1. Mr. Simpson joined General Petroleum in 1924 and in 1935 was transferred to the Socony-Vacuum Oil Company, Inc. as chief development engineer of the Socony-Vacuum Laboratories. Since 1947 he has been director of Socony-Vacuum's research and development laboratories at Paulsboro, New Jersey.

T. P. Simpson

PETROLEUM CHEMICALS DIVISION

DU PONT NEWS

August ★ One of a Series of Interest to the Petroleum Industry ★ 1953

All dressed up...

IN PETROLEUM PRODUCTS!

Miss Joanne Melberg was crowned Queen of the Lakes at the Minneapolis Aquatennial Summer Festival last month.

But what, you ask, has that got to do with the petroleum business? Just this—Miss Melberg's entire wardrobe, including the nylon evening gown she is wearing in the picture above, was made of petroleum-based synthetic fibers. In addition to this nylon dress, her official Festival wardrobe contained suits, dresses, gloves, hats and a bathing suit of "Dacron" polyester fiber. And as Queen of the Festival, she is being sponsored by the Oil Industry Information Committee of the American Petroleum Institute.

This fashionable wardrobe is an excellent example of how the petroleum and chemical industries are working together to develop a world of new products that mean easier and more comfortable living for millions of people.

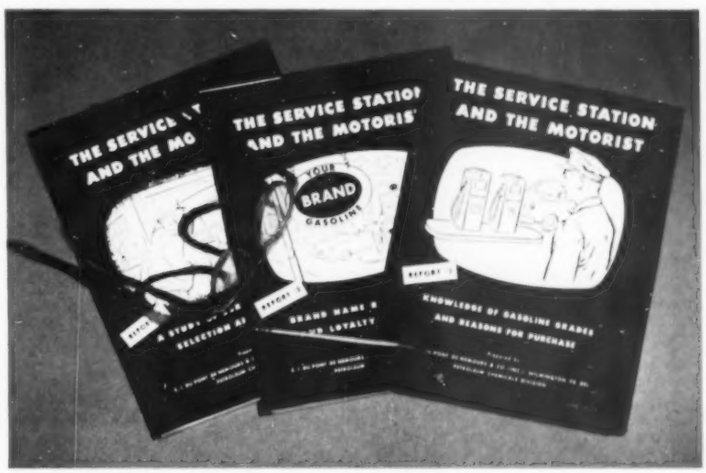
Textile fibers by Du Pont are only one example of the tremendous progress now being made in the development of petroleum-based chemical products. The complete roll call includes hundreds of products that make our work easier, our recreation more enjoyable, our homes more livable, our farms more productive, and our industries more efficient . . . products like anti-freeze, insecticides, synthetic rubber, weed killers, plastics, explosives, finishes, detergents and pharmaceuticals.

How motorists choose the *grade* of gasoline they buy

A merchandising opportunity is pointed up in Du Pont Survey Report No. 3 on Consumer Gasoline Buying Habits

Once the motorist has decided to buy *your brand* of gasoline and driven into the station, which *grade* will he choose? And what is the basis for his choice? Is it price . . . power . . . mileage . . . or the particular requirements of his car?

Findings on these questions are discussed in Report No. 3 of Du Pont's Consumer Gasoline Buying Habits Survey. It is now being distributed to refiners and marketers.



THREE REPORTS on Du Pont's continuing survey of Gasoline Buying Habits have been published so far. The first was a study of service station selection and loyalty. The second covered brand name recognition and loyalty. Future reports will deal with price and credit cards, oil and TBA purchases, and dealer services.

To get this information, 3,100 household interviews and 21,000 observations at 1,193 service stations were conducted as part of the Du Pont survey. National in scope, the survey is representative of gasoline buying patterns and trends throughout the country.

WEST PREFERS PREMIUM

In only one of the four major gasoline marketing areas of the U. S., does the preference for premium exceed that for regular. This is in the West where 55.2% of the motorists say they usually buy the premium grade. In the South the preference for the two grades is practically equal. In the Central area, a big majority prefer regular and regular has an edge over premium for the motorists' preference in the Northeast.

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

PETROLEUM CHEMICALS DIVISION
NEWS

CONTINUED *Survey Report*

PRICE FACTOR

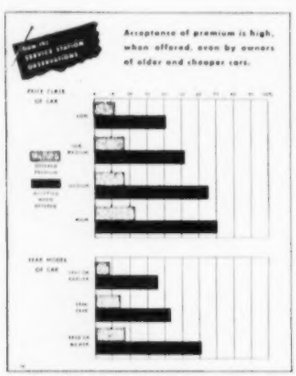
As might be expected, the customers who own more expensive cars and are in the higher income groups are the principal premium purchasers.

Among those motorists surveyed who usually buy the regular grade, 51.9% said they do so because it is *cheaper*. However, there is equal mention of performance of regular as "reason" for its selection. Many of those who usually use regular say its performance is satisfactory or equal to that of premium.

PERFORMANCE COUNTS

Among the premium users surveyed, by far the greatest majority gave reasons that added up to "performance." Of these, 56.9% specifically stated that more power, better pickup, acceleration and all-around performance were the main reasons for their choice. One-quarter said they use premium because it prevents knock. Better mileage, faster starting and high-compression engine requirements were given as reasons for choosing premium by the remainder of motorists who usually buy it.

When asked directly what they considered the *chief differences* between the two grades, the motorists surveyed supplied a wide variety of answers. Power, octane rating, starting speed, mileage and smoothness of performance were the answers most frequently encountered. Such factors as knock resistance and the addition of special ingredients received a smaller percentage of mentions.



A TYPICAL PAGE from Report No. 3 shows that customer acceptance of premium grade gasoline is high, *when offered by dealer.*

SALES OPPORTUNITY

One of the most interesting parts of this Du Pont Survey Report No. 3 deals with the way in which motorists ask for, or "are sold," a particular grade of gasoline. This part of the survey is based on the service station *observations*. These observations reveal what motorists and dealers *actually do* at the point of purchase, rather than what they *think* they do or *say* they do when questioned.

These observations showed that two-thirds of the premium purchasers requested it themselves. *Only one out of eight* of all the motorists observed were *offered premium*. However, *two out of three* of the motorists observed, who were offered premium, followed the suggestion of the dealer in grade selection. And even among the owners of older and cheaper cars, the acceptance of premium grade offers was high.

Information like this, we believe, can be extremely valuable to oil companies in planning their service station merchandising and promotion campaigns.

GULF COAST DISTRICT MANAGER

CHARLES D. TOWERY is manager of the Du Pont Petroleum Chemicals Division Gulf Coast District. He joined the Du Pont Company in 1947. After three years as a sales-service representative in the Petroleum Chemicals Division, he was made district manager of the Mid-Continent District and was transferred to his present assignment in 1952.

Mr. Towery brought to Du Pont a broad background in oil refining. It began with a B.S. degree in Chemical Engineering from Texas A&M in 1932. He then joined the sales department of the Gulf Oil Corporation.

In 1934 he joined the Smiths Bluff Refinery of the Pure Oil Company. For three years he worked on all phases of physical and chemical analysis—including knock test engines—at the refinery control laboratory.

He was transferred in 1937 to Pure Oil Company's operating department as a process engineer. There he gained wide experience in distillation, treating, pumping, blending, instrumentation and many other facets of oil refining. Later he was moved to the company's Chicago office and was assigned to pilot plant studies.

Mr. Towery was called by the Navy in 1942 as petroleum specialist. Following his discharge in 1945 as a Lieutenant Commander, he was associated with Bethlehem Supply Company as sales engineer in the Refinery Sales Department.

LITERATURE AVAILABLE

Here is a partial listing of the bulletins, reports, booklets and aids available to you through any Du Pont Petroleum Chemicals Division district office:

The Service Station and the Motorist—Report Nos. 1, 2 and 3 are now ready for distribution. Authoritative studies on gasoline buying habits in regard to service station loyalty, brand name loyalty and gasoline grade selection . . . Serials A-5396, A-5347 and A-5826

Du Pont Fuel Oil Additive No. 2—A 12-page bulletin describing this ashless stabilizer and dispersant which prevents clogging of fuel oil screens . . . Serial A-5201

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Socony-Vacuum is helping supply the answer by *squeezing more gasoline* from every barrel of crude through improved catalytic refining processes. These new processes make it possible to produce high-quality blending stocks from any crude oil, thus making available greater amounts of higher octane gasoline.

Here are the facts . . . In 1945 Socony-Vacuum obtained a gasoline yield of 39% from a barrel of crude. Today 18% more gasoline—of 40% better performance—is obtained from each barrel . . . enough gasoline daily to take care of 1,100,000 additional cars from the same amount of crude oil.

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Left to right: P. C. Spencer, president of Sun Oil Corp.; M. L. Gosney, executive vice president; Mrs. Gosney, sponsor of the new vessel; Miss Jacqueline Gosney; Mrs. P. C. Spencer; Mrs. H. C. Sinclair; and Robert W. White, president of R. W. White Associates.

Sinclair Adds New Vessel to Fleet

Latest addition to Sinclair Oil Corporation's tanker fleet is the "M. L. Gosney," named for the company's executive vice president and launched on July 15 at the Bethlehem Steel Company's Sparrows Point, Maryland, shipyard. Sponsor of the ship was Mrs. M. L. Gosney, who performed the christening ceremony in the presence of a large group of company officials and guests from oil and shipping circles.

The "M. L. Gosney" is a companion ship of the "P. C. Spencer," named after the president of Sinclair, which was launched from the same yard in November last. She is 25,000 dwt and of dimensions duplicating those of the "P. C. Spencer," with an overall length of 604 ft. 7 inches, a beam of 78 ft., depth of 44 ft. 2 inches, and a loaded draft of 33 feet.

The ship is powered by a high pressure steam-geared turbine capable of developing 13,750 shaft hp, and is designed for a speed of 18 knots.

The "Gosney" is classed by shipping men as a "little supertanker," being slightly smaller in all dimensions than the so-called "supertankers" of 28,000 tons and upward built in recent years. She was designed to size by the Sinclair marine department to meet special navigational requirements of the ports she will serve. She is equipped to carry either crude oil or refined products and will serve the Sinclair refineries at Marcus Hook, Pa., Corpus Christi and Houston, Texas, and Puerto la Cruz, Venezuela, as well as the company's deep water terminals on the Atlantic and Gulf coasts.

Speaking at the luncheon that followed the launching, Mr. Gosney referred to the reduction in the unit cost of moving oil brought about by more efficient tankers, pipe lines and other transport facilities. These and other improvements, he stated, are reflected in the retail price of the industry's principal product, gasoline, which, exclusive of tax, is almost the same as it was more than 25 years ago, even after the recent price increases.

From 1941 through 1952, more than two billion dollars was invested in new tankers and pipe lines, Mr. Gosney said. As an example of the tremendous outlays, he cited investments by 30 of the nation's large oil companies of $1.2 billion in new pipe lines, and $720 million in new marine facilities.

Elected Bell & Burden Vice President

Harry A. Buchanan, formerly superintendent of field operations for Bell & Burden, Inc., drilling contractors, has been elected a vice president. Mr. Buchanan was active in the Santa Fe Springs boom of 1929, where he functioned as driller for George F. Getty. He was for a number of years with Kettleman North Dome Association at Kettleman Hills, and later was northern district superintendent for Loffland Brothers.

Atlantic Refining Licenses Two Catformers

The Atlantic Refining Company has announced the licensing of two new Catformers. Mid-Continent Petroleum Corp. has been licensed to operate a 7,500 b/d Catformer at its West Tulsa, Okla., refinery. M. W. Kellogg Co. is the contractor.

Douglas Oil Co. of California has been licensed to operate a 2,500 b/d Catformer at its Bakersfield, Calif., refinery. The contractor is Ralph M. Parsons.

C. F. Bowen

Charles Franklin Bowen, former chief geologist for the foreign producing department of Standard Oil Company of New Jersey, passed away at his home in Salt Lake City, Utah, on June 26. His age was 82 and the cause of death was a heart attack.

Mr. Bowen attained prominence both as a geologist and as an educator and held professorships at the Michigan College of Mines and at Brigham Young University. His travels during his association with the oil industry carried him to many parts of the world and gave him a wide circle of friends and acquaintances.

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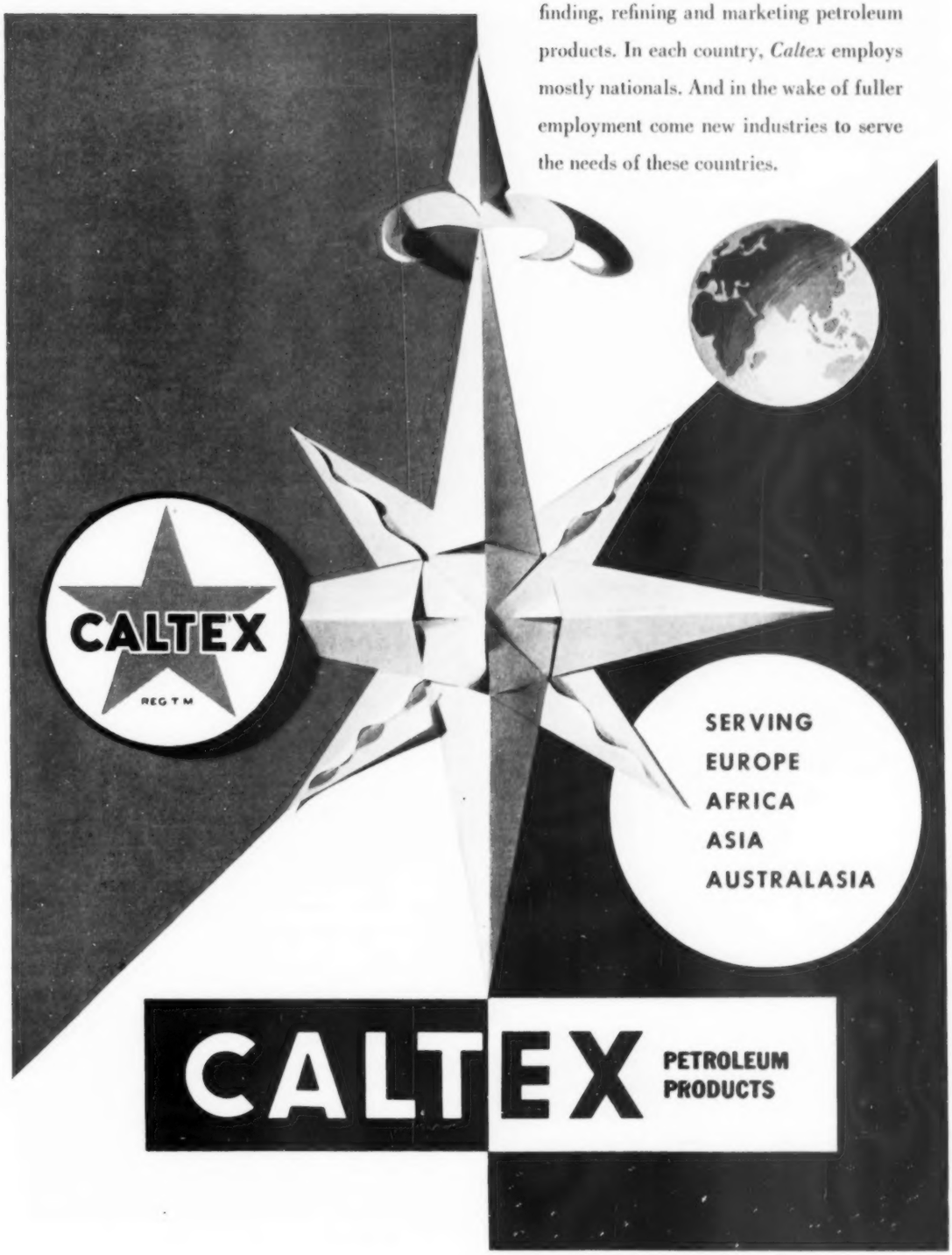

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VOKES filters for engine protection including lubricating oil filters—filtering all the oil all the time; fuel filters, protecting engines and injection equipment from damage through foreign matter in the fuel supply; engine air-intake filters which prevent the ingress of all particle sizes which would otherwise cause needless damage and depreciation.

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VOKES filters for air conditioning include the Microvee Dry Fabric Panel Type Air Filter for ordinary atmospheric conditions, and the famous K.600 Kompak air filter, particularly recommended where oily or sooty atmospheric conditions are encountered. These filters can be serviced with the utmost speed and simplicity.

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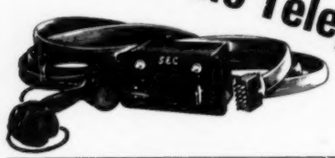

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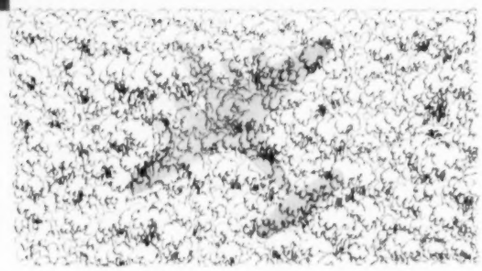
From Tokyo to Karachi; from the minerally rich highlands of Southern Africa to the coastal cities of Australia and New Zealand, the varied petroleum products of Standard-Vacuum weave in some way through the whole pattern of living.



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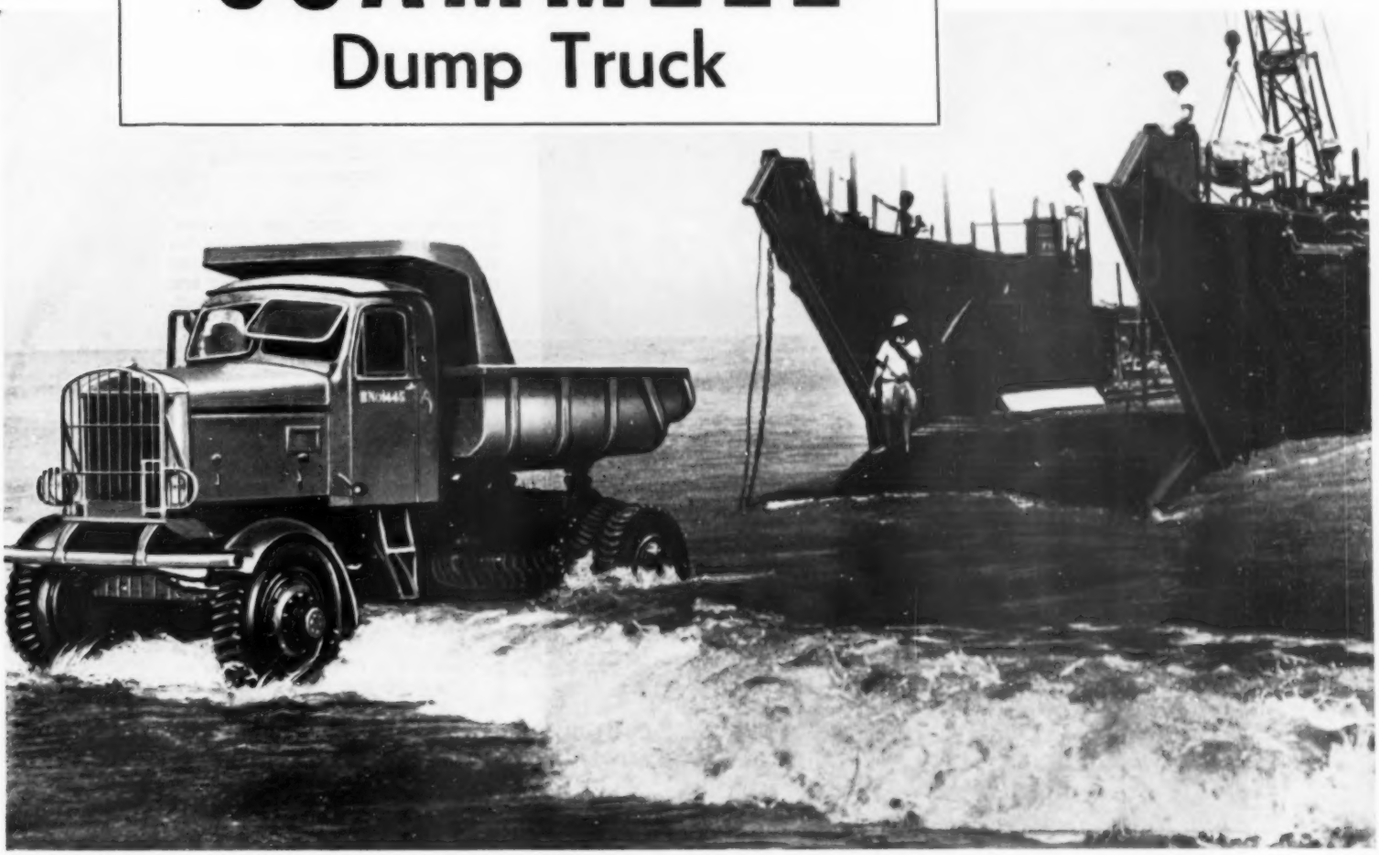
The SCAMMELL Dump Truck

Illustration shows a Scammell 4 x 4 playing its part in combined water and land transport of drilling stores for a new Shell exploration area at Bulak-Setap, near Meri, British North Borneo.



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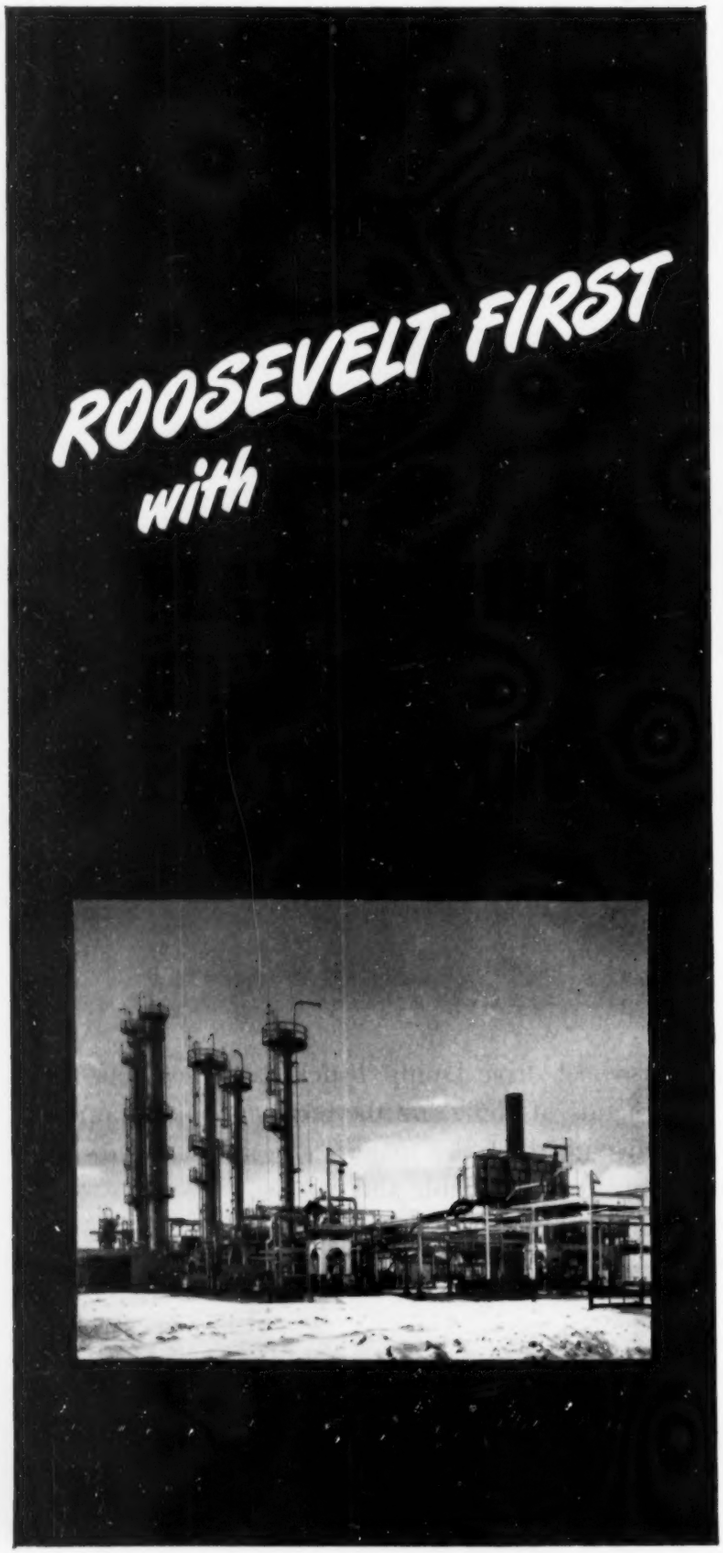


NEW PROCESSES EXPAND MARKETS FOR ROOSEVELT OIL

By J. E. Boudler,
President
Roosevelt Oil and Refining
Corporation

Installation of three new Universal Oil Products Company's facilities has enabled our refinery to enter the premium gasoline market for the first time while simultaneously helping us to expand substantially our present line of specialty naphthas and solvents.

J. E. Boudler

Roosevelt put on stream in January a UOP Platformer, a Udex unit and a unique hydrogenation process called a Platreater. The latter facility has made it possible for us to supplement our aromatics production from the Udex unit by refining aromatic concentrates from which it previously had been impossible to recover pure benzene and toluene.

The premium gasoline we are now marketing under the brand name of "Power-flight" has received wide acceptance in our trade territory of north central and northern Michigan. We are happy to present to our motoring public this unusually fine, well balanced gasoline.

Constant Quality Product

Our Platformer is consistently turning out a stabilized Platformate having an octane number of 92-94 F-1 leaded. This motor fuel blending component is being produced during half a month's motor fuel operation. During the other half of the month, the Platformer produces aromatics.

Roosevelt's Platformer has a design capacity of 1,800 barrels per stream day when producing motor fuel Platformate. The charge rate on the benzene-toluene operation is 1,200 barrels per stream day, from which total 400 barrels per stream day of aromatics are produced.

The Platreater, operating continuously by excess hydrogen from either of the Platformer's operations, is producing 250 barrels per calendar day of aromatics.

The Platreater is the first of its kind in the world to be operated commercially. Roosevelt buys aromatic concentrates used in the Platreater from chemical companies. These distillates are by-products of ethylene production by high severity thermal cracking.

I am sure a brief technical discussion of the Platreater's operation will be of interest to readers.

After the aromatic concentrates are delivered to our refinery by truck, they are pumped from storage tanks to a prefractionator, where a sidecut which makes up the Platreater charge is made. This sidecut is mixed with a gas stream, preheated through heat exchangers, then pumped to a catalytic reactor.

The product goes to a cooler, a separator and finally to a stabilizer column for stabilization to C_6 and heavier bottoms. The bottoms go to the Udex charge tanks, which contain the product of the Platformer's benzene-toluene operation. A combination of the two products forms the feed stock for the Udex unit.

From the Udex charge tanks, the feed stock is pumped to an extractor. There contact is made with the solvent which contains diethylene glycol, which removes aromatics from the feed stock. Non-aromatic raffinate goes through a water wash to storage.

The solvent containing the extracted aromatics is sent to a stripping column, where the aromatics are recovered. The aromatics are sent to a water wash and a clay treater and benzene and toluene are recovered individually as overhead products in subsequent fractionators.

Refinery Handles 7,000 b/d

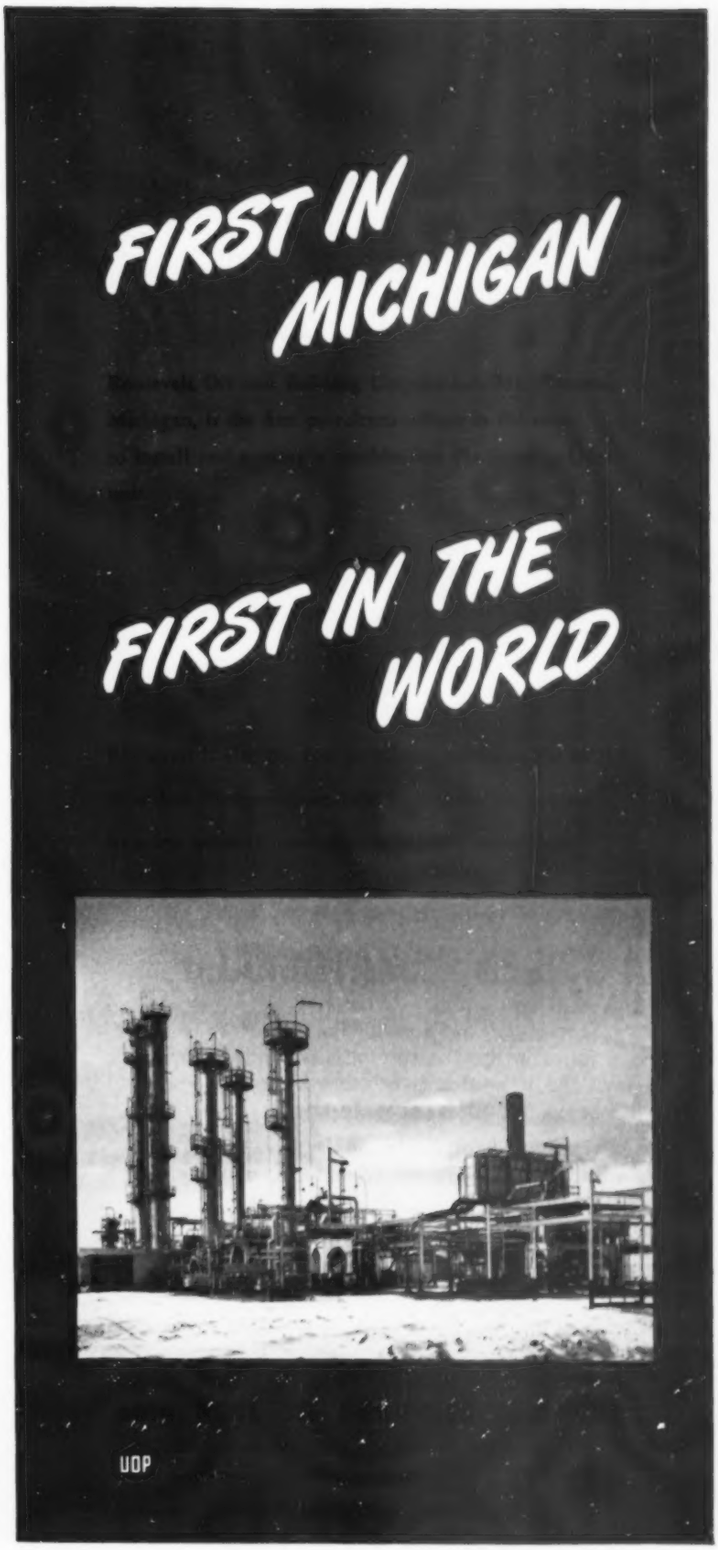
Our refinery is processing 7,000 barrels of Michigan crude a day. In the benzene-toluene operation, we are using a Platformer feed stock having a boiling range of about 150 to 225 degrees F. Materials which have a boiling range of 225 to 400 degrees F. are used when the Platformer is operated for motor fuel production.

Construction of all new units was handled by Procon Incorporated. A central control room, which simplifies operation of the new units, as well as a large graphic panel showing the successive flow through each unit, is an important feature of the new installation. In addition, Procon built roads, erected fences and helped to install transfer piping between all the new units and existing facilities as well as piping to a new tank farm.

Exceptional Quality

The quality of the products produced by the combination of the UOP units has been better than anticipated. The aromatics have such high quality that they easily meet the rigid nitration grade specifications. Our Platformed gasoline has received wide acceptance because of its superior performance. I am happy to report that no materials have been sent to "off specification" tanks since the units began operating.

In addition to producing superior aromatics and motor fuel Platformate, we are adding raffinate to our present line of specialty naphthas and solvents as specialty products.



L. D. Campbell

L. B. Meaders

R. G. Kelly

M. Brummett

H. H. Leonard

D. R. Yager

Halliburton Promotions

Changes in top executive personnel of Halliburton Oil Well Cementing Co. have been announced by Earle P. Halliburton, chairman and founder. The changes were made at the annual stockholders' and directors' meeting in Dallas, Texas, on July 1.

Logan D. Campbell, vice-president and secretary-treasurer, assumes the newly-created post of vice-chairman of the company, assistant to Mr. Halliburton. He was re-elected as director.

L. B. Meaders, vice-president for field operations, succeeds W. R. McClendon, who retired as president after 30 years' association with Earle P. Halliburton. Mr. Meaders also was elected a director.

His former post as vice-president for field operations was filled by R. G. Kelly, who has been regional vice-president in the Gulf Coast areas of Texas, Louisiana, Mississippi and Florida.

Marvin Brummett, assistant general counsel of the company since 1946, was named secretary of the company. H. H. Leonard, assistant secretary-treasurer since 1940, becomes treasurer and assistant secretary.

One new vice-president was named. He is D. R. Yager, manager of Halliburton's Oklahoma division, who succeeds Mr. Kelly as a regional vice-president. He will move from Oklahoma City to Duncan.

All other officers of the company were re-elected at the Dallas meeting. They include: Harry P. Conroy and Fred R. Whitten, regional vice-presidents; Ralph R. Emery, vice-president for foreign operations and export sales; J. Grover Kilgore, vice-president for sales and advertising; W. D. Owsley, vice-president for engineering advice to management; Wilfred Tapper, vice-president for electrical well services; John P. Harbin, assistant secretary; and G. D. McEnroe, assistant treasurer.

New Type Stuffing Box

A new stuffing box design for SJR Shortstir mixers, featuring a mechanical seal and self lubricating shaft bushing, has been developed by Sawyer-Jensen-Ross Co., Tulsa. According to A. C. Jensen, chief engineer, the new stuffing box design was developed with the help of refinery and pipe line operators to eliminate the standard "packed type" stuffing box which frequently leaks while in service and requires a special lubricator.

Lee C. Moore Transfers Chance

Glenn G. Chance, formerly of the engineering department of Lee C. Moore Corp. in Tulsa, is now sales engineer for the company, and will be located in Shreveport. Mr. Chance was educated in Tulsa and served with the United States Marines during the war.

Adman Completes Petroleum Engineering Course

After 18 weeks of brain-whirling confusion, Jim Christopher emerged from a course in petroleum engineering with the most profound respect for the professor. He is a partner of Hill & Christopher, Los Angeles advertising agency for Halliburton Oil Well Cementing Co. and other petroleum service companies.

Mr. Christopher claims that advertising skill needs to be supplemented by specialized training to create selling ads for an industry as complex as the oil business. Bill Graydon, Hill & Christopher copy writer, will attend the class next fall. The basic course in petroleum engineering was given at University of California by Max Taves, Richfield Oil Co. engineer. It covers the field from geology to reservoir engineering.

Fire Proofing for Clothing

A special chemical treatment for clothing which will not burst into flame even when exposed to the intense heat of a blow-torch has been developed by the Treesdale Laboratories and Textile Processing Co. of Pittsburgh. "Permaproof 300," when applied to cotton cloth, provides a durable finish impervious to combustion even at temperatures up to 4,500°. It is claimed the cloth may be laundered repeatedly without losing its fire-retardant properties.

Descale WITHOUT Danger

SKATOSKALO

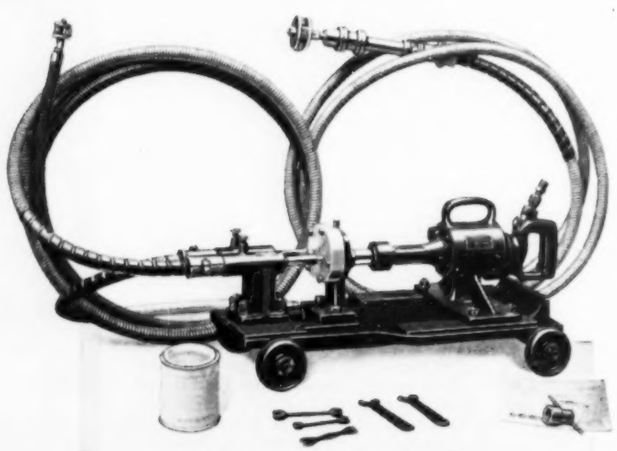
Use AIR-DRIVEN "SKATOSKALO"

THE Air Motor "Skatoskalo" Set enables the operators to descale and clean tubes in the shortest possible time with the greatest efficiency. The air motor gives more horse-power and does not stall when heavy deposit is encountered.

The Air Motor Driven Set incorporates all the advantages of a Rotary Air Tool without sacrificing the advantages of the electrically-driven Flexible Drive type.

"Skatoskalo" equipment can be used with complete safety and is recommended for the efficient maintenance of cracking plant, boilers, evaporators, condensers, heat exchangers, etc.

Tubes of 5/8" internal dia. upwards can be thoroughly cleaned by "Skatoskalo" Air Tools.



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INCORPORATING P. GILMAN (B.S.K.) LTD.

Representatives in all parts of the United Kingdom. Principal agents in over sixty countries throughout the world.

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MOBILE AIR COMPRESSORS

EXTREME INTERCHANGEABILITY THROUGHOUT THE RANGE CONSIDERABLY REDUCES THE FLEET OWNER'S SPARE PART PROBLEMS AND CUTS EXPENSES.

LOW AIR TEMPERATURE INCREASES LIFE OF ALL VALVES, WORKING PARTS AND PNEUMATIC TOOLS.

HIGH EFFICIENCY UNDER EXTREME WORKING CONDITIONS IN ALL CLIMATES GIVING RELIABLE UNINTERRUPTED PERFORMANCE.

AIR PUMPS MOBILE AIR COMPRESSORS OPERATING AT THE SITE OF THE NEW ANGLO-IRANIAN OIL REFINERY AT ADEN

Include:—

105, 210, 250, 315 & 500

c.f.m. Free air delivered

SUPPLYING THE WORLD'S NEEDS FOR

COMPRESSED AIR

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AGENCY OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

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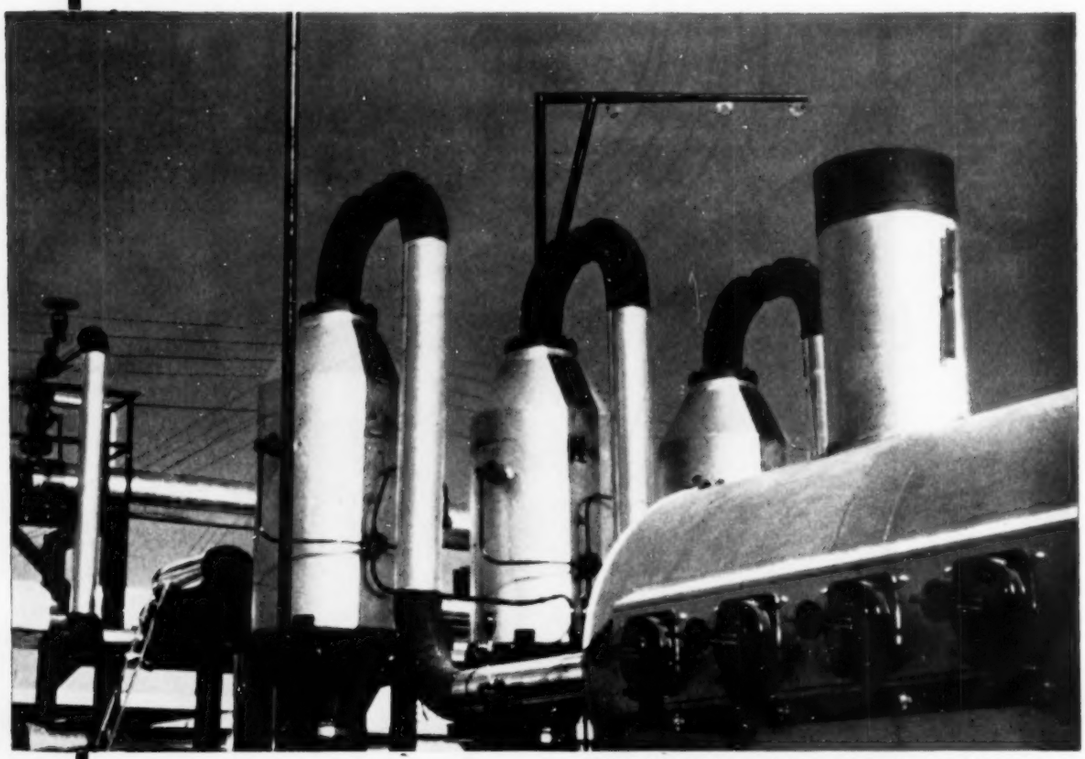


McBride Refinery's Catforming unit at La Blanca, Texas

IN CATALYTIC REFORMING

IT'S THE CATALYST

PLANT GUARANTEES!

McBride Catformer completes initial run. Here are the startling results:

- In its initial run, all guarantees – including throughput, catalyst life, and yield octane – were exceeded.
- Starting with a 30 octane, C4 to 400° F. end point naphtha, the McBride-reformed gasoline has met final gasoline specifications throughout its entire running.
- No expensive feed preparation or product treating is required.
- The ability to regenerate the catalyst in place has been successfully demonstrated at McBride.

DO YOU HAVE YOUR COPY?

This complete bulletin tells the whole story about Catforming. Make sure you get your copy. Write The Atlantic Refining Company, Research and Development Department, P. O. Box 8138, Phila. 1, Pa. (Telephone HO ward 5-2345.)

THAT COUNTS **ATLANTIC**

PARKINSON'S rely on...

CARLISLE

the world's mightiest GRADERS

A complete After Sales Service is maintained by the world distributors.

Sir Lindsay Parkinson & Co. Ltd., in keeping with other leading contractors, rely on CARLISLE GRADERS to handle their tough grading jobs on their many contracts throughout the world.

CARLISLE GRADERS — engineered to meet the toughest possible conditions — are available for sterling. Place your order now — all orders executed in strict rotation.

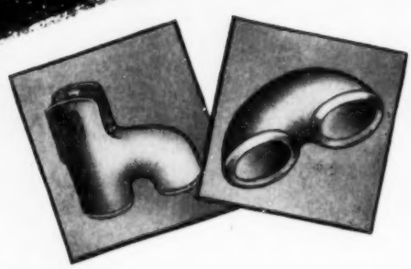
BLACKWOOD HODGE

Subsidiary Companies Branches Works and Agencies throughout the World

OSBORN - OHIO

CAST WELDING TYPE RETURN BENDS

- LONGER LIFE
- LOWER COST
- HEAVIER WALL
- SHORTER CENTRES



TYPE 1001-W.2.
Has one cleanout opening only opposite tube hole, so that by using on alternate end of furnace, each tube can be effectively inspected and cleaned.

TYPE W.2.
Standard Welding 180° U Bend with extra heavy outer wall to ensure longer life.

For Oil Refinery and Chemical Plant.
Made in Sheffield to the design of The Ohio Steel Foundry Co., U.S.A.

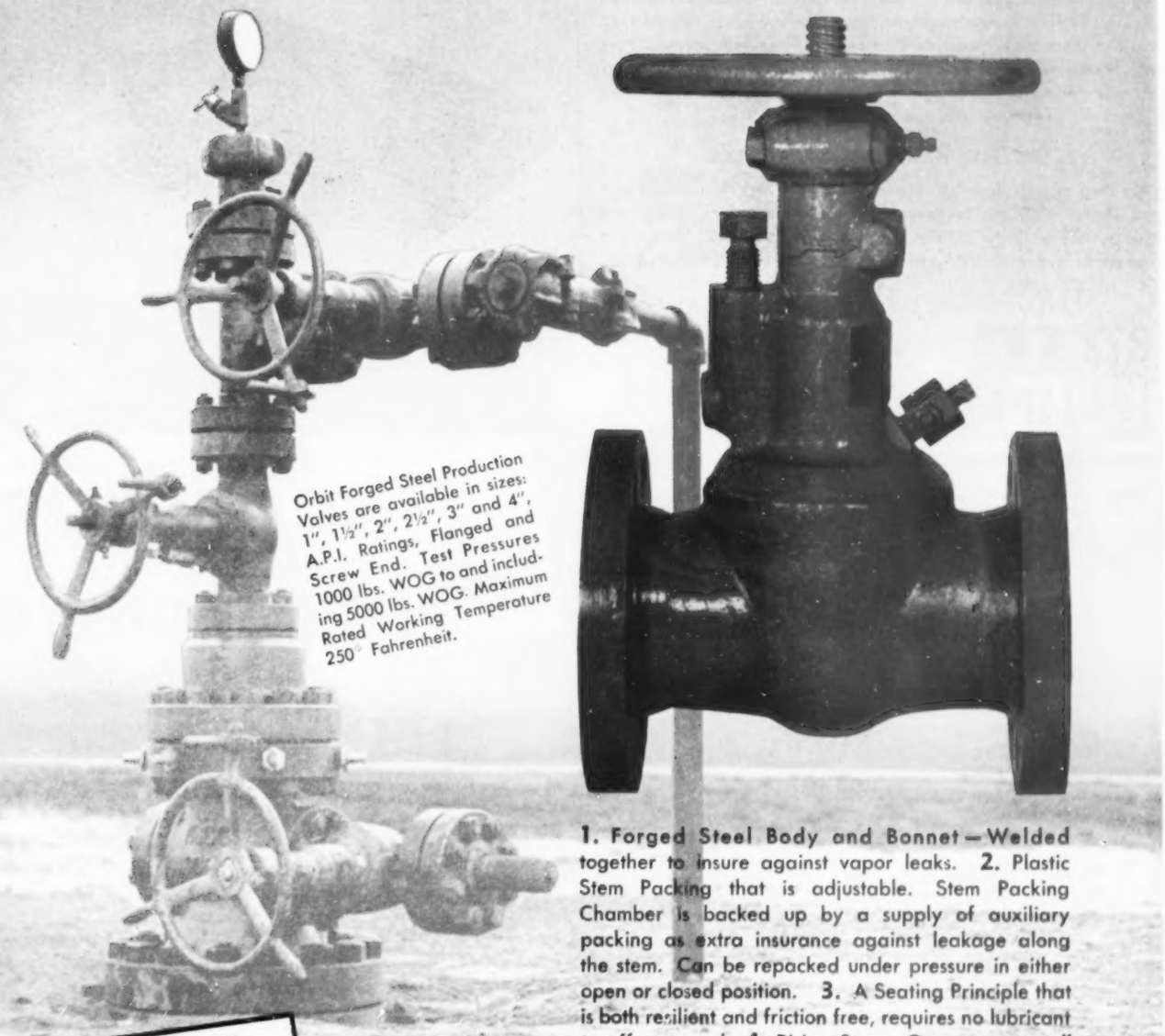
Return Bends are manufactured for all pipe sizes, any I.D. or wall thickness, from any type of cast steel, and on close centre dimensions.

OSBORN

SAMUEL OSBORN & CO., LIMITED
CLYDE STEEL WORKS, SHEFFIELD, ENGLAND.

ORBIT VALVES®

Specified for High and Low Pressure Production



Orbit Forged Steel Production Valves are available in sizes: 1", 1½", 2", 2½", 3" and 4", A.P.I. Ratings, Flanged and Screw End. Test Pressures 1000 lbs. WOG to and including 5000 lbs. WOG. Maximum Rated Working Temperature 250° Fahrenheit.

1. Forged Steel Body and Bonnet—Welded together to insure against vapor leaks. **2.** Plastic Stem Packing that is adjustable. Stem Packing Chamber is backed up by a supply of auxiliary packing as extra insurance against leakage along the stem. Can be repacked under pressure in either open or closed position. **3.** A Seating Principle that is both resilient and friction free, requires no lubricant to effect a seal. **4.** Rising Stem. Operator can tell at a glance whether valve is in open or closed position—guessing can be costly.

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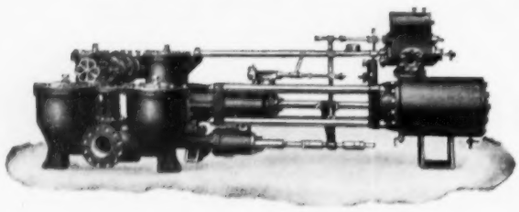
407 Velasco
(Serving the Gulf Coast)
ODESSA, TEXAS
402 West County Road
(Serving West Texas)
CASPER, WYOMING
1740 E. Yellowstone
(Serving the Rocky Mountain States and Canada)

There is only one ORBIT

ORBIT VALVE COMPANY

BOX 699 TULSA, OKLAHOMA

for all refinery duties



REFINERY PUMPS

"Hall" Horizontal Duplex and Horizontal Simplex type pumps are manufactured for almost every refinery service. Pumps can be supplied with steam jackets, elongated water cooled stuffing boxes, special type valves and seats etc. If required they can be fitted with proportioning pumps. Pump ends and internal fittings are of special materials according to the nature of the liquids to be handled. Modifications to suit any individual layout are incorporated as required.

PUMPS FOR HANDLING OIL IN BULK

For handling oil in bulk, "Hall" Horizontal Duplex and Horizontal Compound Duplex type pumps have a proven record of reliability and efficiency, with maximum economy in operation. The "Hall" Compound Duplex pump is specially designed to give minimum steam consumption.

"Hall" pumps of every type are backed by an efficient and comprehensive record system ensuring the correct and prompt supply of spares and replacements.

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PETERBOROUGH — ENGLAND

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THE SUPERIOR STRENGTH IS IN THE JOINT ... WELDED ON BOTH SURFACES

Welded Open Steel

FLOORING
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HANDRAIL **STANDARDS**
AND **HANDRAILING**

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You cannot run the Oil Industry without trucks any more than you can run trucks without oil.

Proof that Thornycrofts supply the right wheeled transport for the Industry is in our large and ever increasing volume of business with the leading organisations.

Illustrated in our *Export Review are Road tankers, Pipe-transporters, Self-loaders, Personnel carriers and other vehicles of special interest to Oil Transport Executives.

**** Expressly produced to help Overseas Buyers — text in English, French and Spanish.***

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WRITE FOR A COPY TO: **JOHN I. THORNYCROFT & CO., LIMITED**
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SMITH SQUARE, LONDON, S.W.1., ENGLAND.

rolling round the world

Aveling-Barford road rollers, from the small footpath type 'G.A.' to the aristocratic 'G.D.', are helping to make the world's roads better and safer. Each is designed for a particular job, but common to the whole range are the features which ensure good performance, reliability and economy in operation.

AVELING-BARFORD

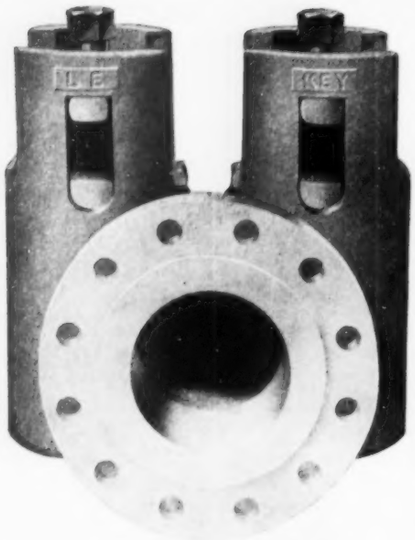
ROAD ROLLERS

Write for Publication No. 1644/33.

ORIGINATORS AND WORLD'S LARGEST MAKERS OF ROLLERS

AVELING-BARFORD LTD. GRANTHAM ENGLAND.

FOR OIL REFINERY & CHEMICAL PLANTS



Two-hole Terminal Fitting with Flanged Side Outlet

MILLENNIUM KEY

Millennium—Key Cast Steel Fittings

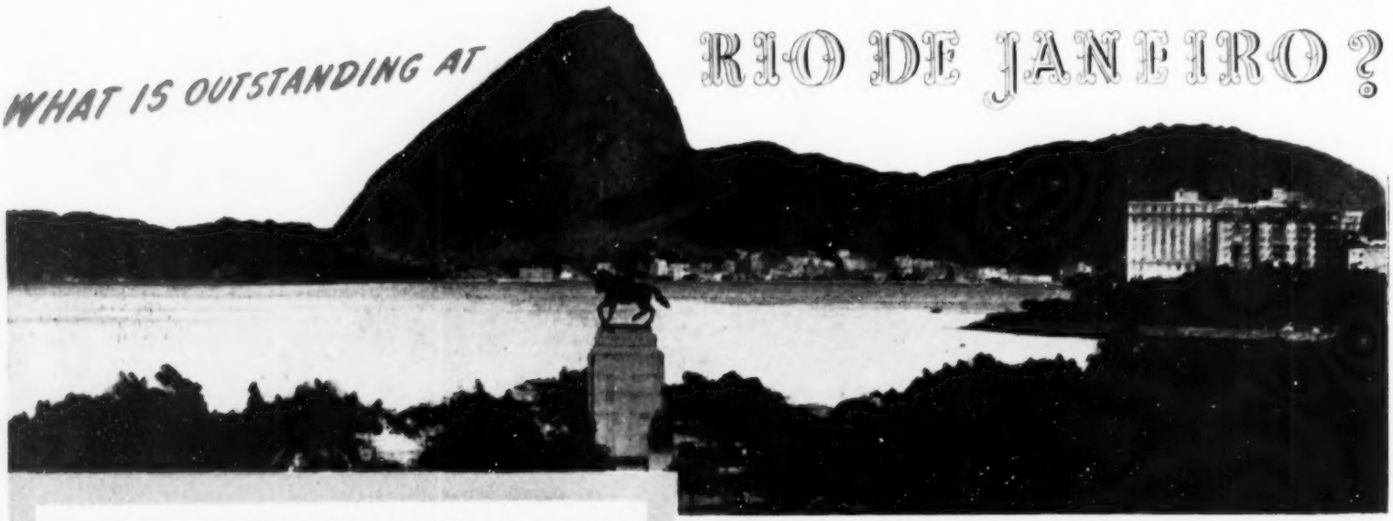
FOR STRENGTH & PRESSURE TIGHTNESS

These four bulletins give full technical information on each type of fitting we can supply. Please write for them

Lake & Elliot Ltd.
BRAINTREE ENGLAND

L4608D

WHAT IS OUTSTANDING AT RIO DE JANEIRO?



The "sugar loaf" mountain, admittedly. International paints fit the Brazilian scene equally well in their own way.

The on-the-spot experience of the associated company in Rio and the accumulated technical knowledge of the central factory at Felling-on-Tyne, England, combine to produce the right paint for every job.

In 15 other countries International have associated companies, all co-operating to ensure that there is the right paint for every purpose and climatic condition. *International* RED LEAD GRAPHITE PRIMER and *International* ALUMINIUM PAINT for storage tanks; and SUNLIGHT ENAMEL for general purposes, are among the many specialties they supply to the oil industry.

International Paints Ltd.

Head Office: GROSVENOR GARDENS HOUSE, LONDON, S.W.1.
TELEPHONE: VICTORIA 3161 (10 LINES) TELEGRAMS: CORROFOIL, SOWEST, LONDON
Branches at: Cardiff, Glasgow, Hull, Liverpool, London, Newcastle, Southampton, West Hartlepool.

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GOTHENBURG	SWEDEN	NEW YORK	U.S.A.	WELLINGTON	NEW ZEALAND
HAMBURG	GERMANY	RIO DE JANEIRO	BRAZIL		

A. W. Krickl

Joins Catalytic Construction

T. Ellwood Webster, president of Catalytic Construction Company, announces the appointment of Wilfred Gains as assistant to W. E. Kelley, vice-president in charge of engineering. Mr. Gains was with the Chemical Construction Corp. as a senior chemical engineer for 12 years. More recently he was a senior project engineer with the Vulcan Copper and Supply Co.

Anson W. Krickl has been appointed assistant to Mr. Webster. Mr. Krickl, who graduated from Yale in 1937 with a degree in Chemical Engineering, was formerly associated with E. B. Badger & Sons Company, and later with Stone & Webster Engineering Corporation.

Youngstown Promotes McClure

Charles T. McClure has been advanced by the Youngstown Sheet and Tube Co. from superintendent of field engineers in its tube division to assistant manager of oil country tubular sales. Mr. McClure was transferred to Youngstown early this year from Youngstown Steel Products Co. of California, where he was a field engineer for six years. Before that he was with Signal Oil & Gas Co. for nine years.

Dr. W. B. Agocs

Joins Aero Service

William B. Agocs, formerly head of the department of geophysics of the University of Tulsa, has joined the staff of Aero Service Corp., Philadelphia. He will consult on airborne magnetometer surveys and other geophysical survey problems. Dr. Agocs was geophysicist in charge of refraction and reflection seismic exploration for Gulf Research and Development Co. in Venezuela, Kuwait, England and Denmark from 1937 to 1940. After four years of teaching, he returned to active oil exploration as chief geophysicist for Venezuelan Atlantic Refining Co. at Caracas. For the past three years he has been with the University of Tulsa.

Wins Advertising Award

For its service advertising in non-merchandising publications which appeared in the pages of WORLD PETROLEUM, the Bechtel Corp. was presented with the award of merit in the 1953 creative competition of the National Advertising Agency Network.

Presentation was made at the 22nd annual management conference of the network, held at the Broadmoor Hotel, Colorado Springs, Colorado, at its annual awards dinner. The award certificates and confirming documents were presented to a representative of Ryder & Ingram, Ltd. of Oakland, Calif., agency for the Bechtel Corp.

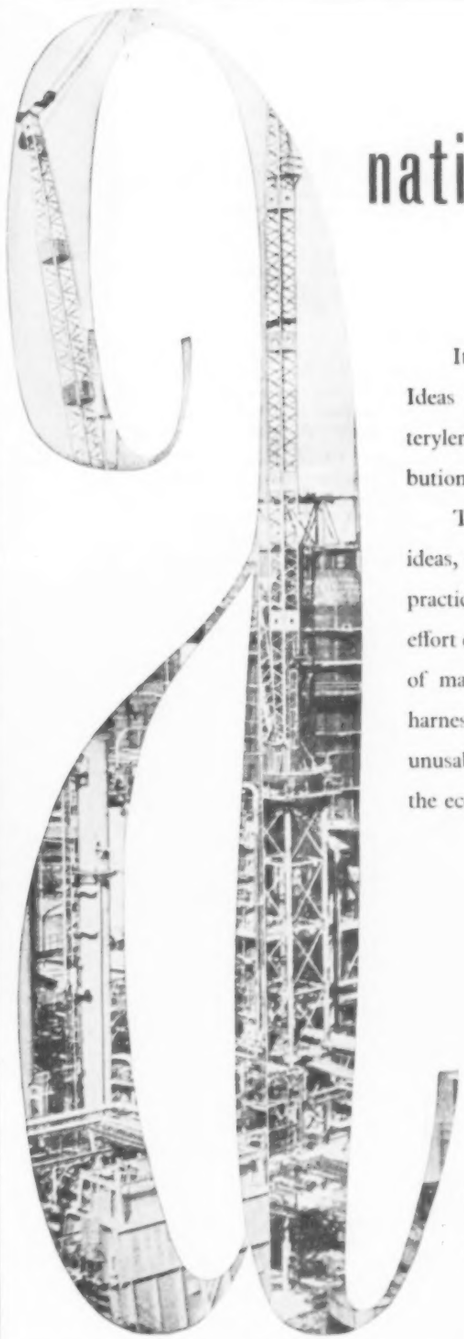
The importance of this competition is shown by the fact that 299 entries were received covering the advertising and publications programs of nationally prominent concerns in this country and Canada. A board of judges, under the direction of Prof. Lloyd D. Herrold, chairman of the department of advertising, Northwestern University, Chicago, selected the winning entries.

Socony-Vacuum Paulsboro Personnel Changes

Several personnel changes in the research and development department of Socony-Vacuum Oil Company, Inc., at Paulsboro, N. J. have been announced by T. W. Nelson, director of the department. T. A. Petry becomes a supervisor in the development division; H. E. Rasmussen becomes assistant supervisor of the refining section; and R. R. Halik and L. M. Browning become research associates in the process development section.

Extend Products Line

The Plantation Pipe Line Co. will extend its 14-inch products pipe line from Charlotte to Greensboro, North Carolina. The 82-mile extension with related facilities will cost approximately $4,500,000 and is scheduled for completion the latter part of this year.



nation needs ideas...

It would be better to say that the world needs ideas. Ideas that work. Ideas like penicillin, the jet engine, terylene, the silicones, among more recent British contributions to world progress.

To contribute to the common endeavour—to share ideas, information and resources—has become a standard practice in chemical engineering. Only by concerted effort can the vast projects which are changing the destiny of mankind be carried through. Chemical engineering harnesses the world's resources anew, utilizes what was unusable, exploits what was unexploitable . . . answers the economic problems of a shrinking planet.

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AND WM.
PRESS
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civil, mechanical and chemical contracting engineers at home and abroad

Head Office: 27 **ASHLEY PLACE, LONDON, S.W.1** *VICtoria 9751 (6 lines). Grams: Demcopress, London*

From the Arctic to the Tropics-

Geolograph's mechanical well logging unit is easily transported; is jungle-proof and desert-proof! Neither sand storm, humidity nor blazing sun affects Geolograph's accuracy in providing a foot-by-foot record which shows depth, connections and down time — at all times! That's why you always save when you log as you drill, with Geolograph!

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Throughout the **PETROLEUM** *Industry—*

AEROFIN FIN-TYPE
HEAT-TRANSFER UNITS
do the job Better,
Faster, Cheaper

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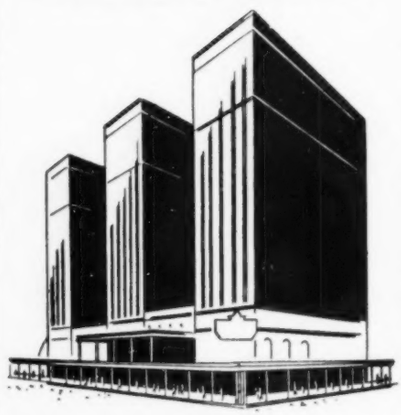
SALES MANAGER wanted for drilling equipment. Appointment in Great Britain for British firm. Applicants should have field experience. Knowledge of diesel engines desirable. Apply stating age, experience and salary required to Personnel Manager, Box 100, WORLD PETROLEUM, St. Paul's Corner, Ludgate Hill, London E. C. 4, England.

Houston Hospitality at its Best!



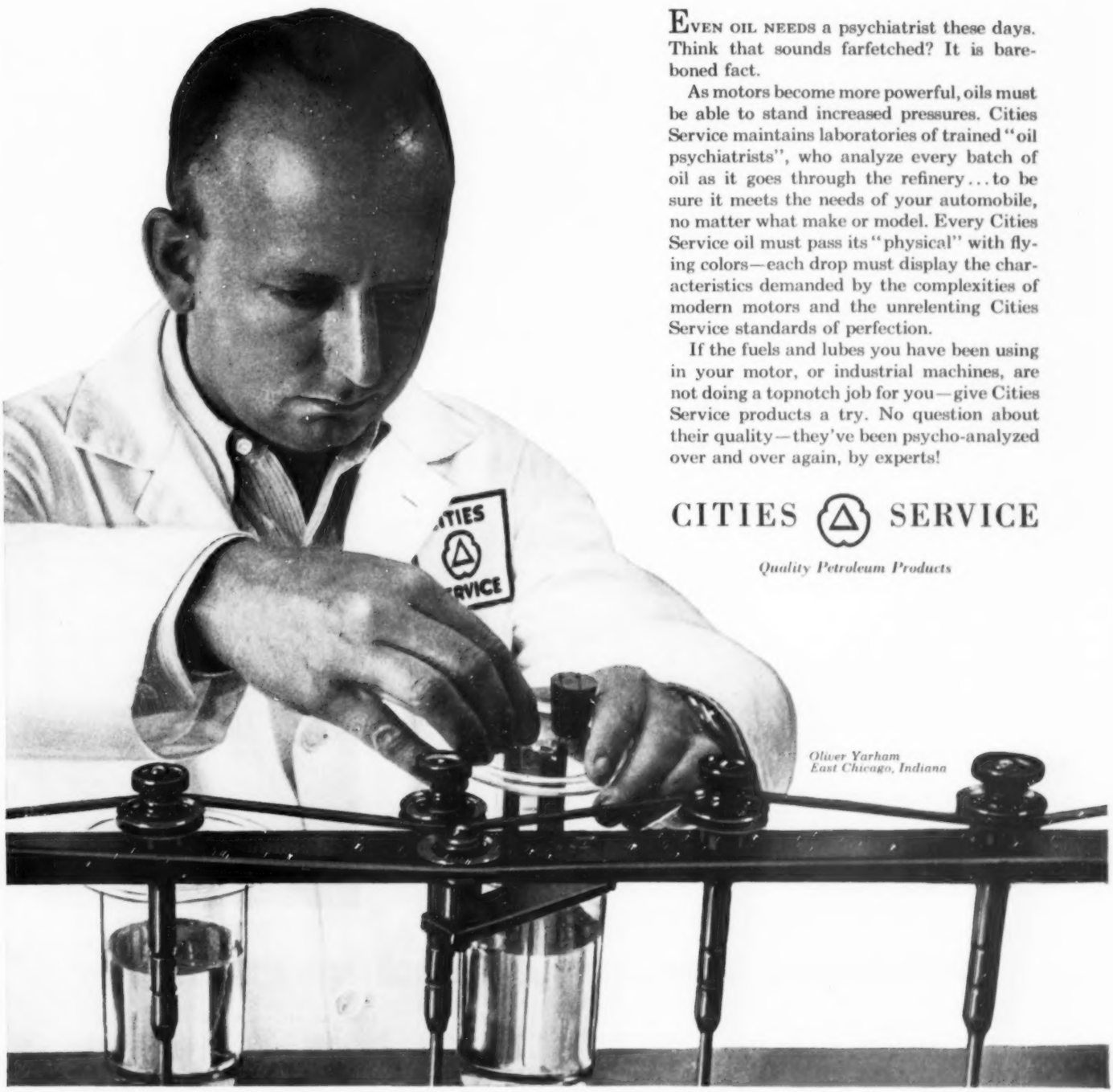
Completely Air Conditioned For Your Comfort

A visit to Houston is your chance to enjoy the big, friendly, modern RICE HOTEL, ideally located in the heart of downtown Houston. Choose from four fine restaurants, including the beautiful Empire Room. Fabulous new PETROLEUM CLUB is now on the entire top floor.

RATES
from $4.50 single and $6.50 double

Rice Hotel
HOUSTON • TEXAS

oil goes to a psychiatrist



EVEN OIL NEEDS a psychiatrist these days. Think that sounds farfetched? It is bare-boned fact.

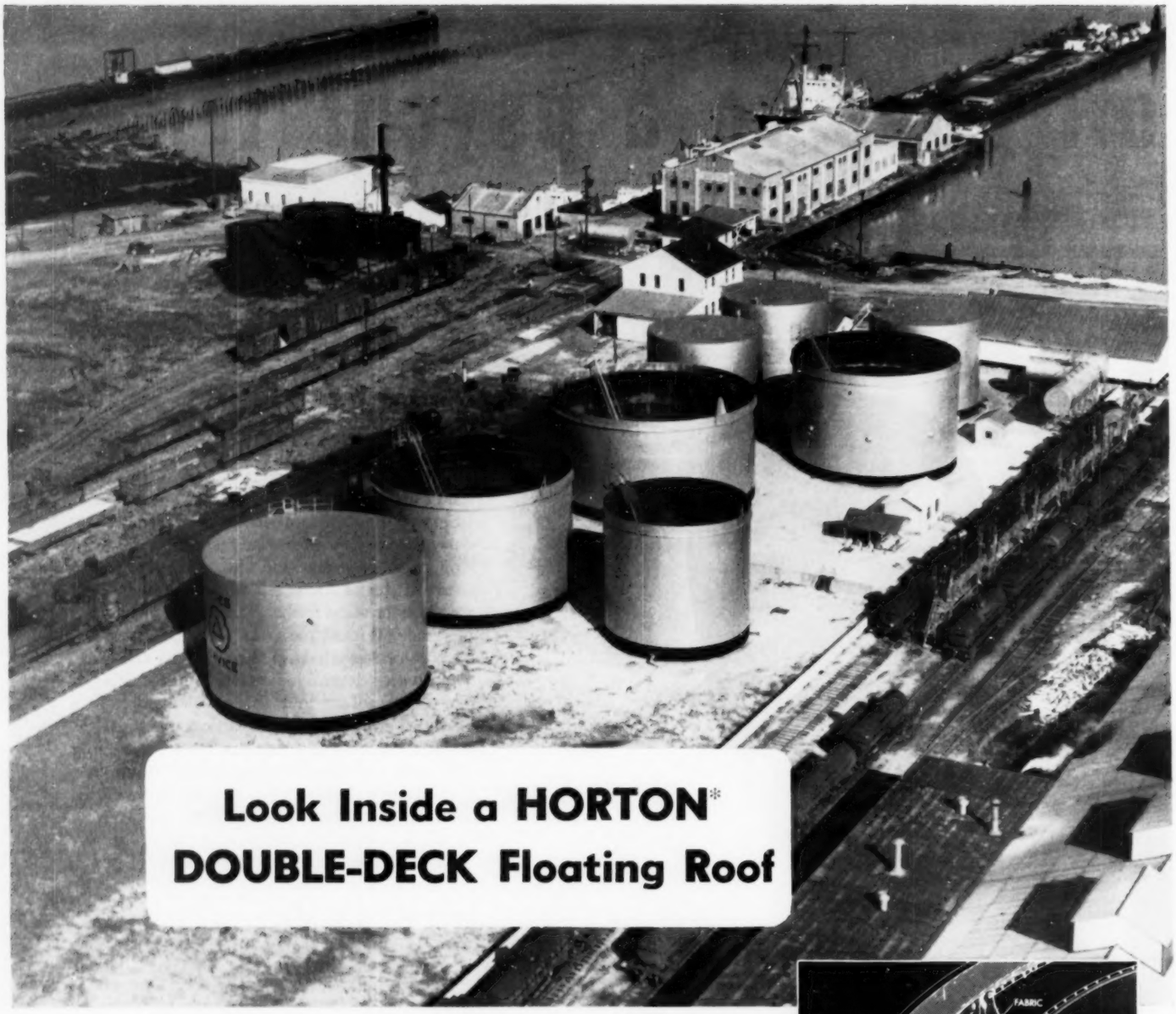
As motors become more powerful, oils must be able to stand increased pressures. Cities Service maintains laboratories of trained "oil psychiatrists", who analyze every batch of oil as it goes through the refinery... to be sure it meets the needs of your automobile, no matter what make or model. Every Cities Service oil must pass its "physical" with flying colors—each drop must display the characteristics demanded by the complexities of modern motors and the unrelenting Cities Service standards of perfection.

If the fuels and lubes you have been using in your motor, or industrial machines, are not doing a topnotch job for you—give Cities Service products a try. No question about their quality—they've been psycho-analyzed over and over again, by experts!

CITIES SERVICE

Quality Petroleum Products

Oliver Yarham
East Chicago, Indiana



Look Inside a HORTON* DOUBLE-DECK Floating Roof

Therein lies the real story of evaporation loss prevention. The Horton* Double-deck Floating Roof provides insulation over all of the liquid in the tank. Floating directly on the surface, the bottom deck is normally in contact with the liquid. There is no air-vapor mixture above the liquid to be vented and lost.

One of the most important features of a Horton Floating Roof is the Horton Seal which efficiently closes the space between the deck and the tank shell. Best for this service, the Horton Seal offers the following advantages:

- No wiper seal or secondary seal is needed on welded steel tanks.
- Continuous sealing ring with vertical flexures every 22 inches —conforms to the contour of the tank shell.
- Pantagraph hangers hold the sealing ring against the shell with uniform, outward pressure and keeps the roof centered.
- A gastight, flexible fabric closes the space between the deck and the top of the sealing ring.

Inside information, estimates or quotations may be had by writing our nearest office. There is no obligation on your part.

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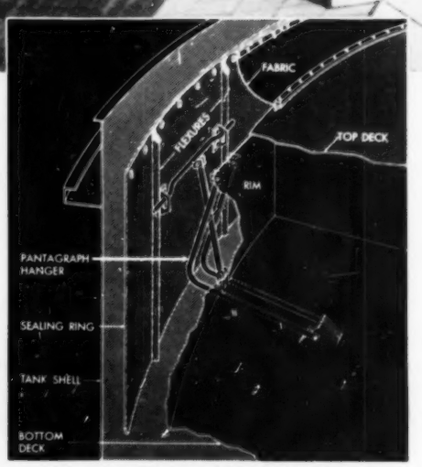

Cutaway view of Horton Seal and Horton Double-Deck Floating Roof.

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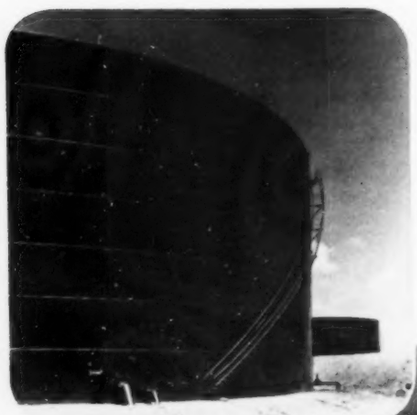

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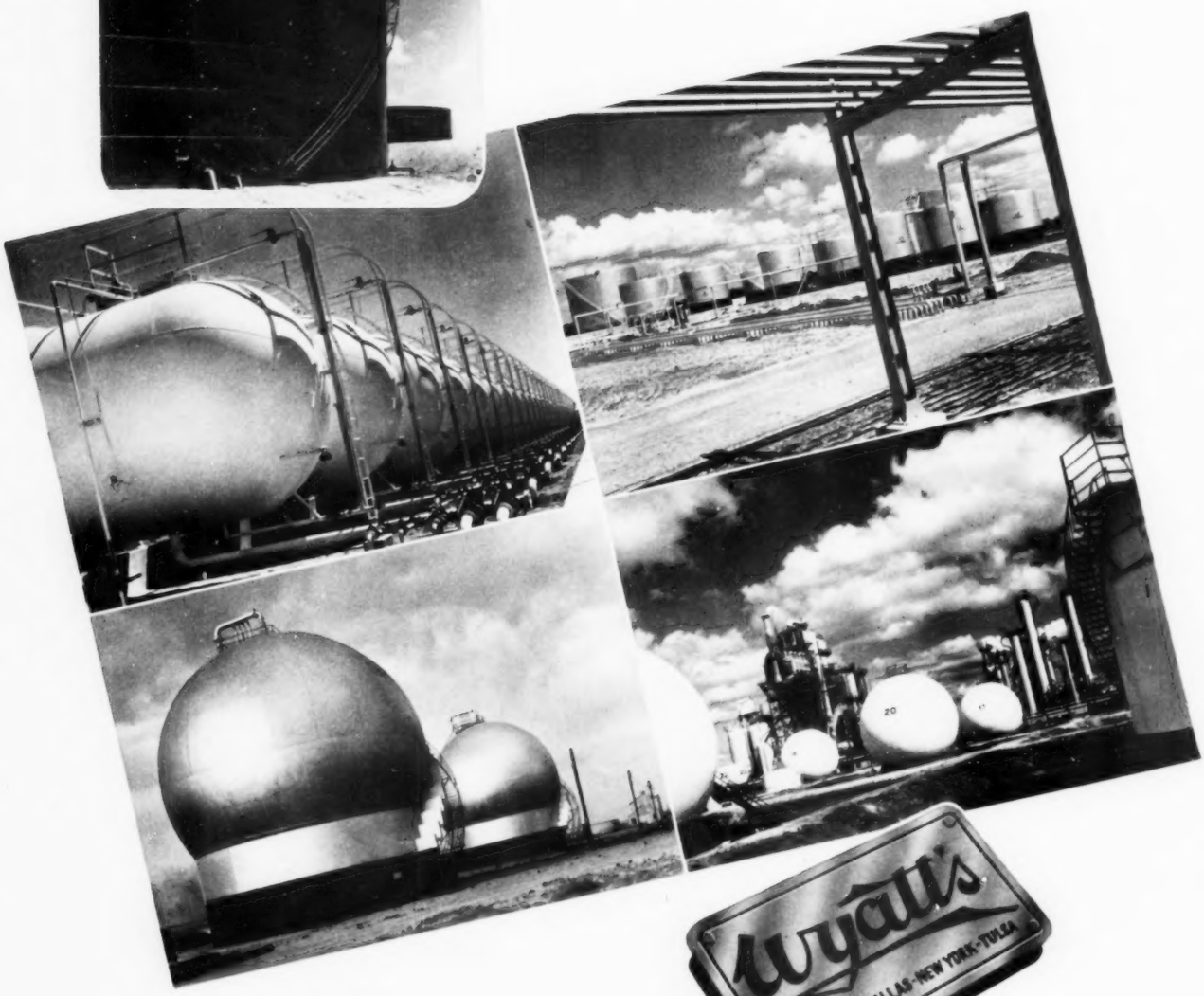

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